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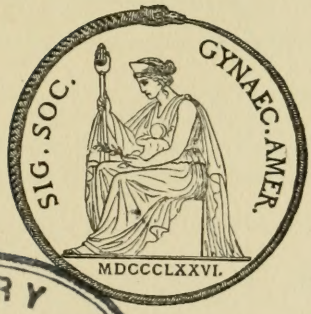
Ohne Haſt
Aber ohne Raſt,
Drehe ſich jeder
Um die eigene Laſt."

GOETHE.

TRANSACTIONS OF THE AMERICAN GYNECOLOGICAL SOCIETY.

VOLUME 32.

FOR THE YEAR 1907.



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NOTE.

The Society does not hold itself responsible for the views enunciated in the papers read at its meetings.

J. RIDDLE GOFFE, M.D., *Secretary*,
No. 616 Madison Avenue, New York.

OFFICERS AND FELLOWS

OF THE

AMERICAN GYNECOLOGICAL SOCIETY,

1907.

OFFICERS FOR 1907.[1]

PRESIDENT.

CLEMENT CLEVELAND, New York.

VICE-PRESIDENTS.

WILLIS E. FORD, Utica.
J. CLIFTON EDGAR, New York.

SECRETARY.

J. RIDDLE GOFFE, New York.

TREASURER.

J. MONTGOMERY BALDY, Philadelphia.

OTHER MEMBERS OF THE COUNCIL.

JOSEPH E. JANVRIN, New York.
[To serve one year.]

EDWARD REYNOLDS, Boston.
[To serve two years.]

EMILIUS CLARK DUDLEY, Chicago.
[To serve three years.]

RICHARD B. MAURY, Memphis.
[To serve four years.]

[1] Officers for the ensuing year may be found in the minutes of the meeting, page xli.

LIST OF OFFICERS

FROM THE ORGANIZATION TO THE PRESENT TIME.

---

* Deceased.

	President.	*Vice-Presidents.*	*Secretary.*	*Treasurer.*
1876.	*Fordyce Barker.	*Washington L. Atlee, *William H. Byford.	*James R. Chadwick.	*Paul F. Mundé.
1877.	*Fordyce Barker.	*Washington L. Atlee, *William H. Byford.	*James R. Chadwick.	*Paul F. Mundé.
1878.	*Edmund R. Peaslee.	*William Goodell, *Isaac E. Taylor.	*James R. Chadwick.	*Paul F. Mundé.
1879.	*T. Gaillard Thomas.	*D. Humphreys Storer, *Henry P. C. Wilson.	*James R. Chadwick.	*Paul F. Mundé.
1880.	*J. Marion Sims.	*W. T. Howard, *Robert Battey.	*James R. Chadwick.	*Paul F.Mundé.
1881.	*W. H. Byford.	T. A. Reamy, *H. F. Campbell.	*James R. Chadwick.	*Paul F. Mundé.
1882.	Thomas Addis Emmet.	*George H. Lyman, *Emil Noeggerath.	*James R. Chadwick.	*Paul F. Mundé.
1883.	*Gilman Kimball.	*Albert H. Smith, *Theophilus Parvin.	Frank P. Foster.	*Paul F. Mundé.
1884.	*Albert H. Smith.	*James R. Chadwick, *Samuel C. Busey.	Frank P. Foster.	Matthew D. Mann.
1885.	*William T. Howard.	Wm. L. Richardson, *Paul F. Mundé.	Frank P. Foster.	Matthew D. Mann.
1886.	Thaddeus A. Reamy.	*Theophilus Parvin, *Geo. J. Engelmann.	Joseph Taber Johnson.	Matthew D. Mann.
1887.	*Alex. J. C. Skene.	John C. Reeve, *Ellwood Wilson.	Joseph Taber Johnson.	Matthew D. Mann.
1888.	*Robert Battey.	*A. Reeves Jackson, *James R. Chadwick.	Joseph Taber Johnson.	Matthew D. Mann.
1889.	*Henry P. C. Wilson.	*William T. Lusk, *Edward W. Jenks.	Joseph Taber Johnson.	Matthew D. Mann.
1890.	John P. Reynolds.	William M. Polk, Ely Van de Warker.	Joseph Taber Johnson.	Matthew D. Mann.
1891.	*A. Reeves Jackson.	Joseph Taber Johnson, William H. Baker.	Henry Clark Coe.	Matthew D. Mann.
1892.	*John Byrne.	Richard B. Maury, *Cornelius Kollock.	Henry Clark Coe.	Matthew D. Mann.

	President.	*Vice-Presidents.*	*Secretary.*	*Treasurer*
1893.	*Theophilus Parvin.	William H. Parish, William H. Baker.	Henry Clark Coe.	Matthew D. Mann
1894.	*William T. Lusk.	*Samuel C. Busey, Bache McE. Emmet.	Henry Clark Coe.	Matthew D. Mann.
1895.	Matthew D. Mann.	*Geo. J. Engelmann, Clement Cleveland.	Henry Clark Coe.	J. Montgomery Baldy.
1896.	William M. Polk.	*James H. Etheridge, *Fernand Henrotin.	Henry Clark Coe.	J. Montgomery Baldy.
1897.	*James R. Chadwick.	*R. Stansbury Sutton, Henry J. Garrigues.	J. Riddle Goffe.	J. Montgomery Baldy.
1898.	*Paul F. Mundé.	Emilius C. Dudley, *Arthur W. Johnstone.	J. Riddle Goffe.	J. Montgomery Baldy.
1899.	Joseph Taber Johnson.	Howard A. Kelly, A. F. A. King.	J. Riddle Goffe.	J. Montgomery Baldy.
1900.	*George J. Engelmann.	Edward L. Duer, Seth C. Gordon.	J. Riddle Goffe.	J. Montgomery Baldy.
1901.	Ely Van de Warker.	Charles Jewett, Richard B. Maury.	J. Riddle Goffe.	J. Montgomery Baldy.
1902.	Seth C. Gordon.	George M. Edebohls, Edward Reynolds.	J. Riddle Goffe.	J. Montgomery Baldy.
1903.	Joseph E. Janvrin.	*Edward W. Jenks, *A. Palmer Dudley.	J. Riddle Goffe.	J. Montgomery Baldy.
1904.	Edward Reynolds.	J. Whitridge Williams, Edward P. Davis.	J. Riddle Goffe.	J. Montgomery Baldy.
1905.	E. Clark Dudley.	Henry D. Fry, Henry C. Coe.	J. Riddle Goffe.	J. Montgomery Baldy.
1906.	Richard B. Maury.	Howard A. Kelly, Reuben Peterson.	J. Riddle Goffe,	J. Montgomery Baldy.
1907.	Clement Cleveland.	Willis E. Ford, J. Clifton Edgar.	J. Riddle Goffe.	J. Montgomery Baldy.

HONORARY FELLOWS.

ELECTED

1884. GEORGE GRANVILLE BANTOCK, M.D., 14 Upper Hamilton Terrace, N. W., London, England.
1876. ROBERT BARNES, M.D., Bernersmede, Eastbourne, England.
1878. JOHN S. BILLINGS, M.D., LL.D., New York Public Library, 40 Lafayette Place, New York.
1893. CHARLES J. CULLINGWORTH, M.D., 14 Manchester Square, W., London, England.
1878. J. AMÉDÉE DOLÉRIS, M.D., Paris, France.
1902. THOMAS ADDIS EMMET, M.D., 93 Madison Ave., New York. *Founder.*
1905. WILLIAM GARDNER, M.D., 109 Union Ave., Montreal, Canada.
1901. HENRY J. GARRIGUES, M.D., 11 West 8th St., New York.
1899. D. BERRY HART, M.D., 29 Charlotte Square, Edinburgh, Scotland.
1902. WILLIAM T. HOWARD, M.D., 804 Madison Ave., Baltimore, Md., *Founder.*
1895. CHARLES JACOBS, M.D., 53 Boulevard de Waterloo, Brussels, Belgium.
1891. CHRISTIAN G. LEOPOLD, M.D., 25 Seminar St., Dresden, Germany.
1888. AUGUST MARTIN, M.D., Greifswald, Germany, Wallenburth, 73.
1892. OTTAVIO MORISANI, M.D., Naples, Italy.
1891. ROBERT OLSHAUSEN, M.D., N. Artillerie St., 19, Berlin, Germany.
1907. CHAUNCEY D. PALMER, M.D., Avondale, Cincinnati, Ohio.
1901. KARL PAWLIK, M.D., Spálená Ulice 3ª, Prague.
1891. SAMUEL POZZI, M.D., 47 Avenue d'Jena, Paris, France.
1907. THADDEUS A. REAMY, M.D., May and June Sts., Cincinnati, Ohio.
1897. JOHN C. REEVE, M.D., LL.D., Dayton, Ohio. *Founder.*
1903. WILLIAM L. RICHARDSON, M.D., 225 Commonwealth Ave., Boston. *Founder.*
1896. PAUL SÉGOND, M.D., 11 Quai d'Orsey, Paris, France.
1888. ALEXANDER R. SIMPSON, M.D., 52 Queen St., Edinburgh, Scotland.
1901. TH. TUFFIER, M.D., 42 Avenue Gabriel, Paris, France.
1881. FRANZ VON WINCKEL, M.D., Sonenstrasse 16ª, Munich, Germany.

Total, twenty-five Honorary Fellows.

HONORARY FELLOWS.

DECEASED.

ELECTED

1877. JOHN L. ATLEE, M.D., Lancaster, Pa.
1892. ROBERT BATTEY, M.D., Rome, Georgia. *Founder.*
1897. SAMUEL C. BUSEY, M.D., LL.D., Washington, D. C. *Founder.*
1890. HENRY F. CAMPBELL, M.D., Augusta, Georgia. *Founder.*
1905. JAMES R. CHADWICK, A.M, M.D., Boston. *Founder.*
1889. M. CHARPENTIER, M.D., Paris, France.
1877. JOHN C. DALTON, M.D., New York.
1877. J. A. H. DEPAUL, M.D., Paris, France.
1878. J. MATTHEWS DUNCAN, M.D., London, England.
1888. ALEXANDER DUNLAP, M.D., Springfield, Ohio.
1876. JOSEPH A. EVE, M.D., Augusta, Georgia.
1889. ROBERT P. HARRIS, M.D., Philadelphia.
1888. GRAILY HEWITT, M.D., London, England.
1881. J. BRAXTON HICKS, M.D., London, England.
1876. THOMAS KEITH, M.D., London, England.
1888. GILMAN KIMBALL, M.D., Lowell, Massachusetts.
1876. ALFRED H. M'CLINTOCK, M.D., Dublin, Ireland.
1888. EMIL NOEGGERATH, M.D., Wiesbaden, Germany. *Founder.*
1877. CHARLES PAJOT, M.D., Paris, France.
1885. W. S. PLAYFAIR, M.D., London, England.
1888. SIR WILLIAM O. PRIESTLEY, M.D., LL.D., London, England.
1901. M. SAENGER, M.D., Prague.
1877. F. W. VON SCANZONI, M.D., Würzburg, Bavaria.
1876. CARL SCHROEDER, M.D., Berlin, Germany.
1876. GUSTAV SIMON, M.D., Heidelberg, Germany.
1888. D. HUMPHREYS STORER, M.D., Boston. *Founder.*
1905. R. STANSBURY SUTTON, M.D., Pittsburg, Pa.
1882. LAWSON TAIT, ESQ., Birmingham, England.
1881. S. TARNIER, M.D., Paris, France.
1888. ISAAC E. TAYLOR, M.D., New York. *Founder.*
1893. T. GAILLARD THOMAS, M.D., New York. *Founder*
1882. J. KNOWSLEY THORNTON, ESQ., London, England.
1886. SIR SPENCER WELLS, BART., London, England.
1876. MARMADUKE B. WRIGHT, M.D., Cincinnati.

ACTIVE FELLOWS.

* Denotes Fellows who are deceased.
† Denotes Fellows who have resigned.

1906.—Andrews, Frank T., M.D., Professor of Clinical Gynecology, Northwestern University Medical School; Gynecologist to Marcy and Wesley Hospitals and South Side Dispensary. 100 State Street, Chicago.

1888.—Ashby, Thomas A., M.D., Professor of Diseases of Women, Baltimore Medical College; Professor of Obstetrics and Clinical Gynecology, Woman's Medical College of Baltimore; Consulting Gynecologist to Home for Incurables; Obstetrician and Gynecologist to Good Samaritan Hospital; Gynecologist to Maryland General Hospital; President of Medical and Chirurgical Society of Maryland. 1125 Madison Avenue, Baltimore.

1895.—Ashton, William Easterly, M.D. Professor of Gynecology, Medico-Chirurgical College of Philadelphia; Gynecologist to Medico-Chirurgical and Philadelphia Hospitals. 2011 Walnut Street, Philadelphia.

Founder.—*Atlee, Washington L., M.D. Made Honorary Fellow, 1877.

1886.—Baer, B. F., M.D. Ex-President of Philadelphia Obstetrical Society; Professor of Gynecology, Philadelphia Polyclinic. *Council*, 1895. 2115 Chestnut Street, Philadelphia.

1882.—Baker, William H., M.D. Formerly Professor of Gynecology, Harvard University; Surgeon to the Free Hospital for Women. *Council*, 1887, 1890. *Vice-President*, 1891, 1893. 22 Mount Vernon Street, Boston.

1889.—Baldy, J. Montgomery, M.D. Professor of Gynecology, Philadelphia Polyclinic; Surgeon to the Gynecean Hospital; Consulting Surgeon to the Jewish and the Frederick Douglas Hospitals. *Treasurer*, 1894–1907. 2219 De Lancey Place, Philadelphia, Pa.

Founder.—*Barker, Fordyce, M.D., LL.D. 1891.

Founder.—*Battey, Robert, M.D. Made Honorary Fellow, 1892.

Founder.—*Bixby, George H., M.D. 1889.

1896.—Boise, Eugene, A.B., M.D. Gynecologist to Butterworth Hospital. Grand Rapids, Michigan.

1888.—Boldt, Hermann J., M.D. Gynecologist to the German Poliklinik; Gynecologist to St. Mark's Hospital; Consulting Gynecologist to the Beth Israel Hospital; Professor of Diseases of Women, New York Post-Graduate Medical School and Hospital; Fellow of the British and International Gynecological Societies. 39 East Sixty-first Street, New York.

1897.—Bovée, J. Wesley, M.D. Professor of Gynecology, George Washington University; Gynecologist to Columbia, Providence, and George Washington University Hospitals, and St. Elizabeth Hospital for the Insane; Consulting Physician to St. Ann's Infant Asylum. The Rochambeau, Connecticut Avenue and H Street, Washington, D. C.

1878.—†Bozeman, Nathan, M.D. 1886.

1905.—Broun, Le Roy, A.B., M.D., Surgeon to Woman's Hospital in the State of New York; Surgeon to Manhattan State Hospital West (Insane Asylum). 70 West Eighty-second Street, New York.

1881.—Browne, B. Bernard, M.D. Professor of Diseases of Women and Clinical Midwifery, Woman's Medical College of Baltimore; Gynecologist to the Good Samaritan Hospital; Consulting Gynecologist to the Hospital for Consumptives. *Council*, 1886, 1893. 510 Park Avenue, Baltimore.

Founder.—*Buckingham, Charles E., M.D. 1877.

1894.—Buckmaster, Augustus H., M.D. 841 Madison Avenue, Columbus, Ohio.

1898.—Burrage, Walter L., A.M., M. D. Gynecologist to St. Elizabeth's and the Carney Hospitals; Surgeon to Outpatients, Free Hospital for Women. 282 Newbury Street, Boston.

Founder.—*Busey, Samuel C., M.D., LL.D. 1901.

1889.—Byford, Henry T., M.D. Professor of Gynecology and Clinical Gynecology, College of Physicians and Surgeons (University of Illinois) of Chicago; Professor of Gynecology, Chicago Post-Graduate Medical School; Sur-

geon to the Woman's Hospital of Chicago; Consulting Gynecologist to Mary Thomson Hospital for Women and Children, to Chicago Lying-in Hospital and Dispensary, to Provident Hospital, and to Michael Rees Hospital. Reliance Building, 100 State Street, Chicago.

Founder.—*Byford, William H., M.D., LL.D. 1890.

Founder.—*Byrne, John, M.D., M.R.C.S.E. 1902.

Founder.—*Campbell, Henry F., M.D. Made Honorary Fellow, 1890.

Founder.—*Chadwick, James R., A.M., M.D. Made Honorary Fellow, 1905.

1903.—Chipman, Walter William, M.D. Lecturer in Gynecology, McGill University; Assistant Gynecologist to Royal Victoria Hospital. 287 Mountain Street, Montreal, Canada.

1903.—Clark, John G., M.D. Professor of Gynecology, University of Pennsylvania; Gynecologist to University and St. Agnes' Hospitals; Consulting Gynecologist to Woman's and Bryn Mawr Hospitals. 218 South Fifteenth Street, Philadelphia.

1889.—Cleveland, Clement, A.M., M.D. Surgeon to the Woman's Hospital in the State of New York: Consulting Gynecologist to General Memorial Hospital. *Council*, 1894. *Vice-President*, 1895. *President*, 1907. 59 West Thirty-eighth Street, N. Y.

1888.—Coe, Henry C., A.M., M.D., M.R.C.S. Gynecologist to Bellevue and General Memorial Hospitals; Consulting Gynecologist to the Woman's and New York Foundling Hospitals; Professor of Gynecology in the University and Bellevue Hospital Medical College. *Secretary*, 1891–96. *Vice-President*, 1905. 8 West Seventy-sixth Street, N. Y.

1888.—*Coleman, John Scott, M.D. 1892.

1896.—Cragin, Edwin B., A.B., M.D. Professor of Obstetrics and of Gynecology, College of Physicians and Surgeons, N. Y.; Attending Physician to the Sloane Maternity Hospital; Consulting Obstetric Surgeon to the City Maternity Hospital and the New York Infant Asylum; Consulting Gynecologist to the New York Infirmary for Women and Children. 10 West Fiftieth Street, New York.

1904.—Cullen, Thomas S., M.D. Associate Professor of Gynecology, Johns Hopkins University; Associate Gynecolo-

gist, Johns Hopkins Hospital; Consulting Gynecologist, Church Home and Infirmary. 3 West Preston Street, Baltimore

1889.—Currier, Andrew F., A.B., M.D. Consulting Gynecologist to McDonough Memorial Hospital, New York, and Ossining Hospital, Sing Sing, N. Y., and Mt. Vernon Hospital, Mt. Vernon, N. Y. 173 East Lincoln Avenue, Mount Vernon, New York.

1893.—Cushing, Ernest W., A.B., M.D. Surgeon to Woman's Charity Club Hospital. 168 Newbury Street, Boston.

1889.—Davenport, Francis H., A.B., M.D. Assistant Professor of Gynecology, Harvard University; Assistant Surgeon to the Free Hospital for Women; Physician to the Department of the Diseases of Women, Boston Dispensary. *Council*, 1891. 419 Boylston Street, Boston.

1891.—Davis, Edward P., A.M., M.D. Professor of Obstetrics, Jefferson Medical College; Professor of Obstetrics and Diseases of Infancy, Philadelphia Polyclinic; Visiting Obstetrician to the Jefferson, Philadelphia, and Polyclinic Hospitals; Clinical Professor of Pediatrics, Woman's Medical College. *Council*, 1896, 1899. *Vice-President*, 1904. 250 South Twenty-first Street, Philadelphia.

1892.—Dickinson, Robert L., M.D. Surgeon (Gynecologist) to Brooklyn Hospital; Obstetrician-in-Chief Methodist Episcopal Hospital; Consulting Gynecologist, St. Mary's Hospital, Jamaica. 168 Clinton Street, Brooklyn, N. Y.

Founder.—*Drysdale, Thomas M., A.M., M.D. 1904.

1889.—*Dudley, A. Palmer, M.D. 1905.

1886.—Dudley, Emilius Clark, A.B., M.D. Professor of Gynecology, Chicago Medical College; Fellow of the British Gynecological Society. *Council*, 1891, 1893. *Vice-President*, 1898. *President*, 1905. 1619 Indiana Avenue, Chicago.

1879.—Duer, Edward L., A.M., M.D. Gynecologist to the Presbyterian Hospital; Visiting Obstetrician to Preston Retreat; Consulting Obstetrician to Philadelphia Maternity, etc. *Vice-President*, 1890. 1606 Locust Street, Philadelphia.

1891.—Edebohls, George M., A.M., M.D. Professor of Diseases of Women, New York Post-Graduate Medical School and Hospital; Gynecologist to St. Francis' Hospital. *Council*, 1896. 12 West Fiftieth Street, New York.

1893.—Edgar, James Clifton, Ph.B., A.M., M.D. Professor of Obstetrics, Cornell University Medical College of New York; Obstetric Surgeon to the Mothers' and Babies' Hospital; Obstetrician to the Emergency Lying-in Hospital. *Vice-President*, 1907. 50 East Thirty-fourth Street, New York.

1907.—Ehrenfest, Hugo, M.D. Assistant Professor of Obstetrics, St. Louis University; Physician-in-Chief, St. Louis Obstetric Dispensary; Obstetrician, Jewish Hospital; Consulting Gynecologist, St. Ann Maternity. 4619 McPherson Avenue, St. Louis, Mo.

1887.—Emmet, Bache McE., M.D. Professor of Gynecology, New York Post-Graduate Medical School and Hospital; Surgeon to the Woman's Hospital in the State of New York. *Vice-President*, 1894. 18 East Thirtieth Street, N. Y.

1895.—Emmet, John Duncan, M.D. Gynecologist to St. Vincent's Hospital. 91 Madison Avenue, New York.

Founder.—Emmet, Thomas Addis, M.D., LL.D. Made Honorary Fellow, 1902.

Founder.—*Engelmann, George J., A.M., M.D. 1903.

1890.—*Etheridge, James H., A.M., M.D. 1899.

1904.—Findley, Palmer, B.S., M.D. Professor of Gynecology, College of Medicine, University of Nebraska. 3602 Lincoln Boulevard, Omaha, Neb.

1889.—Ford, Willis E., A.M., M.D. Medical Director, St. Luke's Hospital; Professor of Electro-Therapeutics, University of Buffalo; Lecturer on Electro-Therapeutics, New York University and Bellevue Medical School. *Council*, 1893. *Vice-President*, 1907. 266 Genesee Street, Utica, N.Y.

1881.—†Foster, Frank P., M.D. 1895.

1902.—Frederick, Carlton C., B.S., M.D. Professor of Clinical Gynecology, University of Buffalo; Surgeon-in-Chief, Buffalo Woman's Hospital. 64 Richmond Avenue, Buffalo, N. Y.

1890.—Fry, Henry D., M.D. Professor of Obstetrics, Medical Department of Georgetown University. 1133 Fourteenth Street, N. W., Washington, D. C.

1876.—Garrigues, Henry J., M.D. Made Honorary Fellow, 1901.

1888.—Gehrung, Eugene C., M.D. President and Chief of the Gynecological Department of the South Side Dispensary; Consulting Gynecologist of the Missouri Bap-

tist Sanitarium: Corresponding Member of Société Obstétricale et Gynécologique de Paris; Membre Titulaire de la Société Française d'Électrothérapie. "The Beers," St. Louis, Mo.

1904.—GELLHORN, GEORGE, M.D. Gynecologist to St. Luke's Hospital; Consulting Gynecologist to City Insane Asylum. 32 Linmar Building, St. Louis, Mo.

1881.—†GILLETTE, WALTER R., M.D. 1889.

1891.—GOFFE, J. RIDDLE, Ph.M., M.D. Professor of Gynecology, New York Polyclinic Medical School and Hospital, and Dartmouth Medical College; Attending Surgeon to the Woman's Hospital in the State of New York; Consulting Gynecologist, St. Joseph's Hospital, Yonkers, N. Y., and to Mt. Vernon Hospital, Mt. Vernon, N. Y. *Council*, 1896. *Secretary*, 1897–1907. 616 Madison Avenue, N. Y.

Founder.—*GOODELL, WILLIAM, A.M., M.D., LL.D. 1895.

1877.—†GOODMAN, JOHN, M.D. 1892.

1888.—GORDON, SETH C., M.D., LL.D. Lecturer on Diseases of Women, Portland School of Medical Instruction; Surgeon to the Maine General Hospital; Consulting Surgeon to the Maine Eye and Ear Infirmary; President of the Maine Academy of Medicine and Science; Ex-President of the Maine Medical Association; Ex-President of the Section of Obstetrics and Gynecology of the American Medical Association; Fellow of the British Gynecological Society. *Council*, 1892. *President*, 1902. Portland, Maine.

1890.—GRANDIN, EGBERT, H. M.D., Consulting Gynecologist to the French Hospital; Attending Gynecologist to Columbus Hospital. 116 West Seventy-sixth Street, N. Y.

1886.—GREEN, CHARLES M., A.B., M.D. Professor of Obstetrics, Harvard University; Senior Visiting Surgeon for Diseases of Women, Boston City Hospital; Visiting Physician to the Boston Lying-in Hospital. *Council*, 1895, 1899. 78 Marlborough Street, Boston.

1887.—*HANKS, HORACE TRACY, M.D., LL.D. 1900.

1895.—HARRIS, PHILANDER A., M.D. Gynecologist to the Paterson General Hospital and to Passaic General Hospital; Corresponding Member of the Obstetrical and Gynecological Society of Paris, France (1885). 26 Church Street, Paterson, N. J.

1894.—Harrison, George T., A.M., M.D. 63 West Fifty-first Street, New York.

1894.—*Henrotin, Fernand, M.D. 1906.

1891.—Hirst, Barton Cooke, M.D. Professor of Obstetrics, University of Pennsylvania; Obstetrician to the University and Maternity Hospitals; Visiting Obstetrician to the Preston Retreat: Gynecologist to the Howard Hospital and to the Southeastern Hospital for Women and Children; Consulting Obstetrician to the Lying-in Charity. 1821 Spruce Street, Philadelphia.

1892.—*Holmes, Horatio R., M.D. 1896.

Founder.—Howard, William T., M.D. Made Honorary Fellow, 1902.

1885.—*Hunter, James B., M.D. 1889.

1891.—Ingalls, Phineas H., A.M., M.D. Gynecologist to the Hartford Hospital. 49 Pearl Street, Room 52, Hartford, Conn.

Founder.—†Ingham, James V., M.D. 1889.

1877.—*Jackson, A. Reeves, A.M., M.D. 1892.

1889.—*Jaggard, W. W., M.D. 1896.

1886.—Janvrin, Joseph E., M.D. President of the New York Obstetrical Society (1889-1891); Consulting Surgeon to St. Elizabeth's Hospital. *Council*, 1889, 1892. *President*, 1903. 191 Madison Avenue, New York.

1895.—Jarman, George W., A.M., M.D. Gynecologist to the General Memorial Hospital; Obstetric Surgeon to the New York Maternity Hospital. 54 West Seventy-sixth Street, New York.

Founder.—*Jenks, Edward W., M.D., LL.D. 1903.

1885.—Jewett, Charles, A.M., M.D. Professor of Gynecology and Obstetrics, Long Island College Hospital, Brooklyn; Attending Physician to Long Island College Hospital; Consulting Obstetrician to Kings County Hospital; Fellow of the British Gynecological Society. *Council*, 1895, 1897. 330 Clinton Avenue, Brooklyn.

Founder.—Johnson, Joseph Taber, A.M., Ph.D., M.D. Professor of Gynecology, University of Georgetown; Gynecologist to the Providence Hospital; President of the Woman's Dispensary; President of the Medical Society of the District of Columbia (1887); Member of the British Medical Association; Fellow of the British Gynecological Society; President

of the Washington Obstetrical and Gynecological Society. *Secretary*, 1886–90. *Vice-President*, 1891. *Council*, 1881, 1885, 1897. *President*, 1899. 926 Farragut Square, Washington, D. C.

1886.—*Johnstone, Arthur W., A.M., M.D. 1905.

1892.—*Keating, John M., M.D., LL.D. 1893.

1887.—Kelly, Howard A., M.D. Professor of Gynecology and Obstetrics in Johns Hopkins University; Gynecologist and Obstetrician to the Johns Hopkins Hospital; Consulting Surgeon to the Kensington Hospital for Women, Philadelphia. *Vice-President*, 1899, 1906. 1418 Eutaw Place, Baltimore, Md.

1886.—King, Albert F. A., A.M., M.D. Professor of Obstetrics and Diseases of Women and Children in the Medical Department of the Columbian University, Washington, and in the University of Vermont; President of the Washington Obstetrical and Gynecological Society (1885–87); Fellow of the British Gynecological Society; Consulting Physician to the Children's Hospital, Washington; Consulting Physician to the Woman's Dispensary. *Council*, 1898. *Vice-President*, 1899. 1315 Massachusetts Avenue, N. W., Washington, D. C.

1892.—Kirkley, Cyrus A., M.D. Toledo, Ohio.

1888.—*Kollock, Cornelius, A.M., M.D. 1897.

1891.—Krug, Florian, M.D. Gynecologist to the Mt. Sinai and the German Hospitals. 616 Madison Avenue, New York.

1881.—*Lee, Charles Carroll, A.M., M.D., LL.D. 1893.

Founder.—*Lusk, William T., A.M., M.D., LL.D. 1897.

Founder.—*Lyman, George H., M.D. 1891.

1892.—McLean, Malcolm, M.D. Surgeon to St. Andrew's Infirmary for Women; Consulting Gynecologist to the Randall's Island Hospitals. 31 East One Hundred and Twenty-sixth Street, New York.

1891.—†MacLaren, Archibald, B.S., M.D. 1903.

1892.—MacMonagle, Beverly, M.D. 3522 Clay Street, San Francisco, Cal.

1882.—Mann, Matthew D., A.M., M.D. Professor of Obstetrics and Gynecology, University of Buffalo; Gynecologist and Consulting Obstetrician to the Buffalo General Hos-

pital. *Treasurer*, 1884–95. *President*, 1895. 37 Allen Street, Buffalo, N. Y.

1901.—Manton, Walter Porter, M.D. Clinical Professor of Gynecology and Adjunct Professor of Obstetrics, Detroit College of Medicine; Gynecologist to Harper Hospital and to the Eastern and Northern Michigan Asylums for the Insane; Consulting Gynecologist to St. Joseph's Retreat; Visiting Obstetrician and Vice-President of Medical Board, Woman's Hospital and Infants' Home; Member of the Committee for the Examination of Midwives, Detroit Board of Health; Fellow of the British Gynecological Society. 32 Adams Avenue, Detroit, Mich.

1883.—Maury, Richard B., M.D. *Council*, 1886, 1888. *Vice-President*, 1892. 111 Court Street, Memphis, Tenn.

1894.—Montgomery, Edward E., A.M., M.D. Professor of Clinical Gynecology, Jefferson Medical College; Gynecologist to Jefferson Medical College and to St. Joseph's Hospitals; Obstetrician to the Philadelphia Hospital. 1703 Walnut Street, Philadelphia.

1891.—Moseley, William E., M.D. Professor of Diseases of Women, Baltimore Medical College; Gynecologist to the Maryland General Hospital. *Council*, 1897. 614 North Howard Street, Baltimore, Md.

Founder.—*Mundé, Paul F., M.D., LL.D. 1902.

1890.—Murray, Robert A., M.D. 112 West Eightieth Street, New York.

1904.—Newell, Franklin Spilman, A.B., M.D. Outpatient Physician, Boston Lying-in Hospital; Assistant Visiting Physician, Department of Gynecology, Boston City Hospital; Assistant in Obstetrics and Gynecology, Harvard University. 379 Beacon Street, Boston, Mass.

1894.—Newman, Henry Parker, A.M., M.D. Professor of Obstetrics and Clinical Gynecology, College of Physicians and Surgeons of Chicago; Professor of Gynecology, Chicago Post-Graduate Medical School; Surgeon (Department of Diseases of Women) to St. Elizabeth, Post-Graduate, and Chicago Hospitals. 108 State Street, Chicago.

1891.—Noble, Charles P., M.D. Surgeon to Kensington Hospital for Women; Lecturer on Gynecology, Philadelphia Polyclinic. *Council*, 1899. 1509 Locust Street, Philadelphia.

1902.—Noble, George Henry, M.D. Gynecologist to Grady Hospital. 131 Pryor Street, Atlanta, Ga.

Founder.—*Noeggerath, Emil, M.D. Made Honorary Fellow, 1888.

1893.—Norris, Richard C., A.M., M.D. Lecturer on Clinical and Operative Obstetrics, Medical Department, University of Pennsylvania; Physician-in-Charge, Preston Retreat; Gynecologist to the Methodist Episcopal Hospital and to the Philadelphia Hospital. 500 North Twentieth Street, Philadelphia.

1880.—Palmer, Chauncey D., M.D. Made Honorary Fellow, 1907.

1885.—†Parish, William H., M.D. 1903.

Founder.—*Parvin, Theophilus, M.D., LL.D. 1898.

Founder.—*Peasley, E. Randolph, M.D., LL.D. 1880.

1895.—Penrose, Charles B., A.M., Ph.D., M.D. 1331 Spruce Street, Philadelphia.

Founder.—†Penrose, Richard A. F., A.M., M.D., LL.D. 1885.

1897.—Peterson, Reuben, A.B., M.D. Professor of Gynecology and Obstetrics, University of Michigan; Gynecologist and Obstetrician to the University Hospital. Ann Arbor, Mich.

1881.—Polk, William M., M.D. Professor of Obstetrics and Diseases of Women and Children, Cornell University Medical College; Physician to Bellevue Hospital and to the Emergency Lying-in Hospital; Consulting Gynecologist to St. Luke's and St. Vincent's Hospitals. *Vice-President,* 1890. *Council,* 1891. *President,* 1896. 7 East Thirty-sixth Street, New York.

1892.—*Pryor, William R., M.D. 1904.

1877.—Reamy, Thaddeus A., A.M., M.D., LL.D. Made Honorary Fellow, 1907.

Founder.—Reeve, John C., M.D., LL.D. Made Honorary Fellow, 1897.

1890.—Reynolds, Edward, M.D. Visiting Surgeon, Free Hospital for Women. *Council,* 1894–1896. *Vice-President,* 1902. *President,* 1904. 65 Marlborough Street, Boston.

1887.—*Reynolds, John P., M.D. 1896.

Founder.—Richardson, William L., M.D. Made Honorary Fellow, 1903.

1892.—†Ritchie, Park, M.D. 1894.

1896.—Robb, Hunter, M.D. Professor of Gynecology, Western Reserve University. 702 Rose Building, Cleveland, Ohio.

1906.—Sampson, John A., M.D., Lecturer in Gynecology, Albany Medical College; Gynecologist to the Albany Hospital. 180 Washington Avenue, Albany, N. Y.

1879.—*Scott, John, M.D., M.R.C.S.I. 1886.

1907.—Simpson, Frank Farrow, A.B., M.D. Gynecologist, Allegheny General Hospital; Consulting Gynecologist, Columbia Hospital. 524 Penn Avenue, Pittsburg, Pa.

Founder.—*Sims, J. Marion, M.D., LL.D. 1883.

Founder.—†Sinclair, Alexander D., M.D. 1894.

Founder.—*Skene, Alexander J. C., M.D. 1900.

Founder.—*Smith, Albert H., M.D. 1886.

1892.—Smith, A. Lapthorn, A.B., M.D., M.R.C.S. (Eng.). Fellow of the London Obstetrical Society; Fellow of the Société de Médecine Pratique, Paris; Professor of Clinical Gynecology in Bishop's College; Surgeon-in-Chief to Samaritan Free Hospital for Women; Gynecologist and Consulting Surgeon to the Montreal Dispensary; Gynecologist to the Western Hospital. 238 Bishop Street, Montreal, Canada.

1905.—Smith, Richard R., M.D. Surgeon to Butterworth Hospital. Grand Rapids, Michigan.

1898.—Stone, Isaac S., M.D. Clinical Professor of Gynecology, University of Georgetown; Gynecologist to Columbia Hospital for Women; Fellow of British Gynecological Society. Connecticut Avenue and L Street, N. W., Washington, D. C.

1905.—Stone, William Stephen, A.B., M.D. Instructor in Gynecology, Columbia University; Chief of Clinic, Department of Gynecology, Vanderbilt Clinic. 41 West Seventy-first Street, New York.

Founder.—*Storer, D. Humphreys, M.D. 1903.

1891.—*Strong, Charles P., A.B., M.D. 1893.

1879.—*Sutton, R. Stansbury, A.M., M.D., LL.D. Made Honorary Fellow, 1905. 1906.

1906.—Taussig, Frederick Joseph, A.B., M.D., Assistant Gynecologist, Washington University; Gynecologist to St. Louis Skin and Cancer Hospital. 2318 Lafayette Street, St. Louis, Mo.

1905.—Taylor, Howard C., Ph.B., M.D. Junior Attending Gynecologist, Roosevelt Hospital; Instructor in Gynecology, Columbia University. 24 West Fiftieth Street, New York.

Founder.—*Taylor, Isaac E., M.D. Made Honorary Fellow, 1888.

Founder.—*Thomas, T. Gaillard, M.D. 1903.

1898.—Thompson, John T., A.M., M.D. Professor of Diseases of Women, Bowdoin School for Medical Instruction; Surgeon to the Maine General Hospital. 211 State Street, Portland, Maine.

Founder.—*Trask, James D., M.D. 1883.

1879.—†Underhill, J. W., M.D. 1886.

Founder.—Van de Warker, Ely, M.D. Surgeon to the Central New York Hospital for Women; Surgeon to the Syracuse Woman's and Children's Hospital. *Council*, 1885, 1889, 1896. *Vice-President*, 1889. *President*, 1901. 104 Fayette Park, Syracuse, N. Y.

1897.—Vineberg, Hiram N., M.D. Attending Gynecologist to St. Mark's Hospital; Gynecologist to Mt. Sinai Hospital Dispensary; Gynecologist to the Montefiore Home for Chronic Invalids. 751 Madison Avenue, New York.

1903.—Wakefield, W. Francis B., M.D. 2609 California Street, San Francisco.

Founder.—*Wallace, Ellerslie, M.D. 1885.

1891.—Wathen, William H., A.M., M.D., LL.D. Professor of Abdominal Surgery and Gynecology in the Kentucky School of Medicine; Ex-President of the Section on Obstetrics and Gynecology of the American Medical Association; Ex-President of the Kentucky State Medical Society; Fellow of the Southern Surgical and Gynecological Society; Gynecologist to the Louisville City Hospital and to the Kentucky School of Medicine Hospital. 628 Fourth Avenue, Louisville, Ky.

1896.—Watkins, Thomas J., M.D. Attending Gynecologist to St. Luke's, Lakeside, and Provident Hospitals, Chicago; Consulting Gynecologist to Silver Cross Hospital, Joliet, Ill.; Clinical Instructor in Gynecology, Northwestern University Medical School. 3564 Grand Boulevard, Chicago.

1898.—Webster, J. Clarence, B.A., M.D. (Edin.), F.R.C.P.E. Professor of Obstetrics and Gynecology, Rush

Medical College, University of Chicago; Fellow of the Royal Society of Edinburgh; Fellow of the Edinburgh Obstetrical Society; Corresponding Member of the Royal Academy of Palermo, Italy, and of the Italian Obstetrical and Gynecological Society. 706 Reliance Building, 100 State Street, Chicago.

1902.—Wells, Brooks H., M.D. Professor of Gynecology in the New York Polyclinic Medical School and Hospital; Consulting Surgeon to the Brattleboro Memorial Hospital, Brattleboro, Vt. 523 Madison Avenue, New York.

Founder.—*White, James P., M.D. 1881.

1892.—Williams, J. Whitridge, A.B., M.D. Professor of Obstetrics, Johns Hopkins University; Gynecologist to Union Protestant Infirmary. *Council*, 1899. *Vice-President*, 1904. 1128 Cathedral Street, Baltimore.

1887.—*Wilson, Elwood, M.D. 1889.

Founder.—*Wilson, Henry P. C., M.D. 1898.

1886.—Wylie, W. Gill, M.D. Professor Emeritus of Gynecology, New York Polyclinic Medical School and Hospital; Gynecologist to Bellevue Hospital; Consulting Surgeon to the Methodist Episcopal Hospital, Brooklyn; Fellow of the British Gynecological Society. 28 West Fortieth Street, New York.

Total, 92 Active Fellows.

MINUTES OF THE PROCEEDINGS

AT THE

THIRTY-SECOND ANNUAL MEETING

OF THE

AMERICAN GYNECOLOGICAL SOCIETY,

HELD AT

WASHINGTON, D. C.,

MAY 7, 8, 9, 1907.

THIRTY-SECOND ANNUAL MEETING.

WASHINGTON, D. C., *May* 7, 8, 9, 1907.

The following members were present:

FRANK T. ANDREWS,	Chicago.
THOMAS A. ASHBY,	Baltimore.
WILLIAM E. ASHTON,	Philadelphia.
B. F. BAER,	Philadelphia.
WILLIAM H. BAKER,	Boston.
J. MONTGOMERY BALDY,	Philadelphia.
EUGENE BOISE,	Grand Rapids, Mich.
HERMAN J. BOLDT,	New York.
J. WESLEY BOVÉE,	Washington.
LE ROY BROUN,	New York.
B. BERNARD BROWNE,	Baltimore.
HENRY T. BYFORD,	Chicago.
WALTER W. CHIPMAN,	Montreal.
JOHN G. CLARK,	Philadelphia.
CLEMENT CLEVELAND,	New York.
EDWIN B. CRAGIN,	New York.
THOMAS S. CULLEN,	Baltimore.
ERNEST W. CUSHING,	Boston.
FRANCIS H. DAVENPORT,	Boston.
EDWARD P. DAVIS,	Philadelphia.
ROBERT L. DICKINSON,	Brooklyn.
E. C. DUDLEY,	Chicago.
EDWARD DUER,	Philadelphia.
GEORGE M. EDEBOHLS,	New York.
J. CLIFTON EDGAR,	New York.
BACHE MCE. EMMET,	New York.
WILLIS E. FORD,	Utica.
CARLTON C. FREDERICK,	Rochester.
HENRY D. FRY,	Washington.
WILLIAM GARDNER,	Montreal.

Henry J. Garrigues,	New York.
George Gellhorn,	St. Louis.
J. Riddle Goffe,	New York.
Seth C. Gordon,	Portland, Me.
Egbert H. Grandin,	New York.
Charles M. Green,	Boston.
Philander A. Harris,	Paterson, N. J.
Joseph E. Janvrin,	New York.
Charles Jewett,	Brooklyn.
Joseph Taber Johnson,	Washington.
Howard A. Kelly,	Baltimore.
Albert F. A. King,	Washington.
Malcolm McLean,	New York.
Beverly McMonagle,	San Francisco.
Walter P. Manton,	Detroit.
E. E. Montgomery,	Philadelphia.
William E. Moseley,	Baltimore.
Robert A. Murray,	New York.
Henry P. Newman,	Chicago.
Charles P. Noble,	Philadelphia.
Charles B. Penrose,	Philadelphia.
Reuben Peterson,	Ann Arbor.
William M. Polk,	New York.
Edward Reynolds,	Boston.
Hunter Robb,	Cleveland.
John A. Sampson,	Albany.
Lapthorn Smith,	Montreal.
Richard R. Smith,	Grand Rapids.
I. S. Stone,	Washington.
Frederick J. Taussig,	St. Louis.
Howard C. Taylor,	New York.
John T. Thompson,	Portland, Me.
Hiram N. Vineberg,	New York.
W. F. B. Wakefield,	San Francisco.
William H. Wathen,	Louisville.
Thomas J. Watkins,	Chicago.
J. Clarence Webster,	Chicago.
Brooks H. Wells,	New York.
W. Gill Wylie,	New York.

First Day.—*Tuesday, May 7, 1907.*

Morning Session.—The Society met in the University Hall, George Washington University, and was called to order by the President, Dr. Clement Cleveland, of New York, at 10 A.M.

The Secretary announced an invitation received from the Cosmos Club, extending its courtesies to the members and guests of the Society.

Dr. J. Wesley Bovée, of Washington, D. C., was then introduced, and delivered the following

Address of Welcome.

Mr. President and Fellow Members: The Congress of American Physicians and Surgeons has kindly favored Washington by making it its meeting-place, and the American Gynecological Society has particularly favored it by meeting here many times before. The profession feels proud to have an organization of thirty years' standing, such as this, meet here. We had hoped that while you were here the city would be in its most beautiful garb, and we expected to have our parks full of blossoming flowers. But the seasons have not played us fair, we think. We had summer in March, and then a relapse of winter, which has continued until the present time. I imagine, however, that you have had similar experiences in your own sections of the country.

The field of gynecology has been encroached upon by general surgery, and an effort has been made all along the line to make gynecology a mechanical specialty rather than one of real science. I understand that in many cities gynecologists are scarcely allowed to live; they are not given positions in institutions, etc. Here in Washington we feel we have altogether a different position. I have noticed, for instance, that while the American Gynecological Society has five members residing here, the American Surgical Association has but one member. Gynecology occupies a prominent position in Washington, and while we have a large number of gynecologists here, we have too few surgeons.

We are always glad to welcome you to this city of educational and governmental institutions, and I would mention particularly our medical library, with which most of you are familiar. It gives me great pleasure to welcome you to our city, and to make you feel at home. We trust that you will enjoy yourselves during the time you are here. (Applause.)

Response by Dr. Seth C. Gordon.

Mr. President and Fellows of the American Gynecological Society: Two or three weeks ago our President wrote and asked me if I would respond in behalf of the Society to Dr. Bovée's Address of Welcome. I could not see any special reason for it, either from a lack of ability on the part of the President, or any ability of my own. However, having had more or less soldierly experience in my life, I always obey orders, and I wrote him I would do the best I could.

We all like to come to Washington, no matter where we live. If we happen to live in my city by the sea, where the American people wander up and down through the beautiful streets of that dear old town; or if we happen to be born in Boston, where we are perfectly assured that we shall never have to be born again, we like to come to Washington; or if we come rom New York, the metropolis of the world, or from a little farther down the Atlantic coast, the great cities of Philadelphia and Baltimore, or if we hail from Cleveland, or the Windy City—not gaseous city—or still farther West, from the Pacific slope, no matter where we turn or where we were born, or live, we are always glad to come to Washington. When we are frozen up in the New England cities and towns, we are almost sure to find a little relief when we get to Washington. Further, we know that when we come to this city we come, in my opinion, to the most beautiful capital in the world. It is becoming not only a beautiful capital, but the centre of a great many other things. It is getting to be the seat of art; it is going to be the seat of everything that makes life interesting, pleasant, and profitable. We all look forward to our triennial visit to Washington. In addition to all of the beauties and privileges Wash-

ington affords, we also know that we will always have a warm reception from the profession. Of that we are sure. They seem to take delight in entertaining us. They seem to enjoy giving us good things to eat and plenty to drink. That is saying a good deal for a man coming from Maine, and I can truly say, on behalf of the members of the American Gynecological Society, that it is a pleasure for us to receive all these things. Our time will be fully occupied, aside from our professional work, with the luncheons, dinners, and receptions which have been so admirably planned by our local executive committee, and I therefore feel that we can most heartily respond to the invitation that has been extended to us by Dr. Bovée. May our meeting at this time be not unlike those we have formerly held here. (Applause.)

Papers were read as follows:

1. "Ovarian Implantation Metastases Following Cancer of the Cervix Uteri," by Dr. Fred. J. Taussig, of St. Louis, Mo.

This paper was discussed by Drs. Bovée, Lapthorn Smith, Peterson, Chipman, and in closing by the essayist.

2. "A New Method of Version," by Dr. A. F. A. King, of Washington, D. C.

This paper was discussed by Drs. Edgar, Harris, Murray, Grandin, and in closing by Dr. King.

3. "The Superiority of Primary over Secondary Cesarean Section; Feasibility and Advantages of a Predetermination of the Method of Delivery," by Dr. Edward Reynolds, of Boston, Mass.

4. "Pubiotomy," by Dr. Henry D. Fry, of Washington, D. C.

5. "Induced Labor and Delivery by Abdominal Section," by Dr. Edward P. Davis, of Philadelphia.

These three papers were discussed jointly by Drs. Grandin, Lapthorn Smith, Edgar, Murray, Dickinson, Cushing, Gellhorn, Gordon, McLean, Harris, Ford, and in closing by the essayists.

Dr. J. Clarence Webster, of Chicago, exhibited a specimen of ovarian pregnancy; also a specimen of uterus and tubes removed from a hermaphrodite.

The cases and specimens were discussed by Drs. Cushing, Cullen, Wathen.

On motion, the following gentlemen were made members by invitation and invited to participate in the discussions: Dr. Lewis S. McMurtry, of Louisville, Kentucky; Dr. W. H. Carmalt, of New Haven, Conn.; Dr. David Barrow, of Lexington, Kentucky; Dr. Franklin H. Martin, of Chicago; Illinois; Dr. A. M. Alexander, of Paterson, New Jersey; and Dr. W. W. Westbrook, of Brooklyn, New York.

On motion, the Society adjourned until 9 A.M., Wednesday.

SECOND DAY.—*Wednesday, May* 8, 1907.

Morning Session.—The Society met at 9 A.M., and was called to order by the President.

Symposium: The Care of the Wound and the After-treatment of Laparotomies.

6. "The Method of Closing the Wound," by Dr. Seth C. Gordon, of Portland, Maine.

7. "The Method of Closing the Wound," by Dr. C. A. Kirkley, of Toledo, Ohio. (Read by title.)

8. "Catgut or Silver Wire for Approximating the Deep Fascia," by Dr. Hunter Robb, of Cleveland, Ohio.

9. "The Use of Laxatives in the After-treatment," by Dr. Henry T. Byford, of Chicago.

10. "Eserine Salicylate as a Prophylactic against Atony of the Bowels," by Dr. Hiram N. Vineberg, of New York.

11. "Care of the Stomach and Bowels; Position and Rest in Bed," by Dr. A. Lapthorn Smith, of Montreal.

12. "The Incision and After-treatment," by Dr. W. Gill Wylie, of New York.

13. "The After-care of the Patient," by Dr. Herman J. Boldt, of New York.

14. "The After-care of the Patient," by Dr. J. Montgomery Baldy, of Philadelphia.

In connection with the symposium, Dr. Boldt exhibited Dr. A. Brothers' combination ice-bag. This bag is about 16 inches in diameter; there are three separate bags united in one, and the bag will adapt itself to the contour of the abdomen. It is very light, because of an aluminum layer;

it needs attention once an hour; it is perfectly clean. It covers the whole or any section of the space between the lower end of the sternum and symphysis.

The discussion of the symposium was opened by Dr. I. S. Stone, and continued by Drs. Baer, Manton, Grandin, McMurtry, MacMonagle, Ford, Smith, Cushing, Noble, Thompson, Murray, Polk, and the discussion closed by the essayists.

At this juncture, Dr. J. Montgomery Baldy, of Philadelphia, took the Chair, and President Cleveland delivered his address.

At the conclusion of the Address, Dr. Egbert H. Grandin moved that a vote of thanks be extended to the President for his admirable address, and for the manly stand which he had taken in a matter of such vital importance to innocent women and unborn children. He also moved that a standing committee be appointed by the Chair in accordance with the recommendations contained in the President's Address.

The two motions were seconded by Dr. William M. Polk, and carried unanimously. The President said he would appoint the Committee called for by the motion later.

Dr. Brooks H. Wells, of New York, delivered an oration on Dr. Henry Garrigues, an Honorary Fellow of the Society, in appreciation of his work in introducing asepsis into obstetric practice.

The oration was followed by remarks by Drs. Robert F. Murray, Egbert H. Grandin, and Wm. M. Polk.

Dr. Garrigues responded to the remarks made in appreciation of his work.

On motion, the Society adjourned until 2.30 P.M.

Executive Session.

The Society met in Executive Session at 2.30 P.M. Wednesday, May 8, President Cleveland presiding. A quorum was present. The minutes of the last meeting were presented and approved. The Secretary announced that since our last meeting the Society had lost by death its esteemed Fellow, Dr. Fernand Henrotin.

The Treasurer presented his report as follows: Balance forward, $293.92; dues, interest, and initiation fees, $1524.39. Total, $1818.31. Expenses, $1622.62; balance in treasury,

$195.69. Auditing Committee was appointed and reported books correct.

On motion of the Council, Dr. Thaddeus A. Reamy, by unanimous vote, was made Honorary Fellow. The Secretary announced that Dr. Chauncey D. Palmer, by his own request, in accordance with the By-laws, had been placed on the list of Honorary Fellows.

On motion of Dr. Dickinson, in accordance with recommendations in the President's Address, a Committee on Nomenclature was appointed, consisting of Drs. Dickinson, Williams, and Bovée. The President also announced, in accordance with the resolution adopted in general session, a Committee on Sanitary and Moral Prophylaxis, consisting of Drs. Kelly, Polk, and Grandin.

Dr. Harris offered the following resolution, which was adopted: *Resolved*, That a committee be appointed by the President of the Society to make a study of its Constitution and By-laws, to determine if, in its judgment, the interests of the Society would be better subserved by making any changes, alterations, or additions thereto. That it shall address a circular letter to every member of the Society, asking for suggestions pertaining to this work, and that this Committee shall submit its report to the Society at its next annual meeting. That this Committee shall consist of the President of the Society, its Secretary, and four other Fellows, one of whom shall be a member of the Council, and the other three selected from the Fellowship of the Society at large, provided that none of the three selected are at present holding any office in the Society. The Committee, as constituted, consists of Dr. Harris, Chairman; Dr. Reynolds, Dr. Robb, Dr. Boise, Dr. Baldy, and Dr. Goffe.

The following resolution was presented and adopted:

"Whereas, The Committee of One Hundred of the American Association for the Advancement of Science has taken an active part in the movement, now for some years so strongly advocated by the American Medical Association and other scientific bodies in this country, looking toward the establishment of national control over all matters relating to public health; therefore, be it resolved that the American Gynecological Society heartily endorses this movement and desires to put itself on record to that effect."

The Committee on the McDowell Memorial Meeting, 1909, reported progress.

The report of the Council was then read, recommending Dr. Hugo Ehrenfest and Dr. Frank Farrow Simpson to the favorable consideration of the Society. They were thereupon elected by ballot Fellows of the Society.

The Secretary announced that Dr. Wakefield had received and accepted the set of TRANSACTIONS of the Society tendered him; Dr. MacMonagle had courteously declined.

The officers for the ensuing year were then balloted for, with the following results:

President—Dr. J. Montgomery Baldy, Philadelphia.

First Vice-President—Dr. I. S. Stone, Washington, D. C.

Second Vice-President—Dr. Eugene Boise, Grand Rapids, Michigan.

Treasurer—Dr. Charles P. Noble, Philadelphia.

Secretary—Dr. J. Riddle Goffe, New York.

Member of Council—Dr. Clement Cleveland, New York.

Place of meeting, Philadelphia, fourth Tuesday in May, 1908.

J. RIDDLE GOFFE,
Secretary.

THIRD DAY.—*Thursday, May* 9, 1907.

Morning Session.—The Society met at 9 o'clock, with the President in the Chair.

This was a combined meeting with the American Association of Genito-urinary Surgeons to discuss in symposium the surgery of the kidney.

Papers were read as follows:

15. "Some Congenital Variations of the Kidneys and Ureters, in Reference to their Development and Surgical Importance," illustrated by numerous lantern slides, by Dr. Geo. S. Huntington, of New York.

16. "The Radiographic Diagnosis of Renal Lesions" (plates illustrated by lantern slides), by Dr. Lewis Gregory Cole, of New York.

17. (*a*) "Specimens and Illustrations of Renal Lithiasis; (*b*) Pyonephrotic Stone Kidney; (*c*) Renal Tuberculosis," by Dr. Chas. H. Chetwood, of New York.

18. "Diagnosis and Treatment of Calculi in the Lower End of the Ureter in the Male," by Dr. Hugh H. Young, of Baltimore, Md.

19. "Calculous Anuria, with Special Reference to Bilateral Renal Calculus, and to the Simultaneous Performance of Bilateral Nephrolithotomy in those Cases, and to Calculous Anuria Occurring in Patients Having but One Kidney," by Dr. Francis S. Watson, of Boston, Mass.

20. "The Value and Method of Mensuration in Vesical, Ureteral, and Renal Work," by Dr. Howard A. Kelly, of Baltimore, Md.

21. "A Consideration of the Pathology, Diagnosis, and Treatment of Acute Unilateral Septic Infarcts of the Kidney," by Dr. Geo. E. Brewer, of New York.

22. "Some Requirements of Up-to-date Nephrectomy," by Dr. George M. Edebohls, of New York.

In connection with the symposium, Dr. William E. Moseley, of Baltimore, showed a kidney with a calculus in the pelvis shutting off the ureter.

The discussion of the symposium was participated in by Drs. Caldwell, Banks, Brown, Cragin, Hagner, Lapthorn Smith, Cole, and Chetwood.

On motion, the Society adjourned until 3 P.M.

Afternoon Session.—The Society reassembled at 3 P.M., with the President in the Chair.

This was a combined meeting with the American Ophthalmological Society, to discuss in symposium "The Prophylactic and Curative Treatment of Ophthalmia Neonatorum."

Papers were read as follows:

23. "The Necessity of the Silver Treatment," by Dr. J. Clifton Edgar, of New York. (Read by title.)

24. "What Silver Salt Shall be Used? What Strength?" by Dr. Edwin B. Cragin, of New York.

25. "The Present Status of the Question from the Standpoint of the Ophthalmologist," by Dr. Lucien Howe, of Buffalo, N. Y.

The symposium was discussed by Drs. Lapthorn Smith, Manton, Lewis, Green, Fry, Hubbell, Taylor, and in closing by Dr. Cragin.

26. "Cystic Lymphangioma of the Gastrocolic Omentum, by Dr. W. Francis B. Wakefield, of San Francisco, Cal.

27. "Ectopic Gestation, with Special Reference to the Treatment of Tubal Rupture," by Dr. Hunter Robb, of Cleveland, Ohio.

This paper was discussed by Drs. Baldy, Frederick, Harris, Goffe, Stone, Moseley, and Robb.

The President then announced the appointment of the following committees:

Committee of Prophylaxis of Venereal Diseases: Drs. Howard A. Kelly, William M. Polk, and Egbert H. Grandin.

Committee on Constitution and By-laws: Drs. Philander A. Harris, Eugene Boise, and Hunter Robb.

Committee on Nomenclature: Drs. Robert L. Dickinson, J. Whitridge Williams, and J. Wesley Bovée.

28. "Incision of the Anterior Uterine Wall (Anterior Colpohysterotomy) as the Treatment of Chronic Inversion of the Uterus," by Dr. Reuben Peterson, of Ann Arbor, Mich.

Discussed by Drs. Brown, Cushing, and Peterson.

29. "A Study of the Uterosacral Ligaments from the Standpoint of their Utility as Uterine Supports," by Dr. I. S. Stone, of Washington, D. C.

30. "Postoperative Inversion of the Vagina; a Presumably New Operation for Its Cure," by Dr. Philander A. Harris, of Paterson, N. J.

Discussed by Dr. Stone.

As there was no further business, either scientific or otherwise, to come before the meeting, on motion, the Society then adjourned, to meet in Philadelphia, the fourth Tuesday in May, 1908.

J. RIDDLE GOFFE, M.D.,
Secretary

CONSTITUTION.

I. This Society shall be known as the AMERICAN GYNECOLOGICAL SOCIETY.

II. The object of this Society shall be the promotion of knowledge in all that relates to the Diseases of Women, to Obstetrics, and to Abdominal Surgery.

FELLOWS.

III. The Fellows of this Society shall consist of Fellows and Honorary Fellows.

The Fellows shall not exceed one hundred in number.

The Honorary Fellows shall not exceed ten American and twenty-five foreign.

Candidates shall be proposed to the Council, by two Fellows *only*, at least one month before the first day of the meeting, each nomination being accompanied by a list of the principal publications of the candidate and of the official positions which he holds. Each candidate shall submit to the Council at least one month before the first date of meeting an unpublished paper upon some subject connected with gynecologic or obstetric science, and on nomination by the Council shall be balloted for at the annual meeting. A two-thirds affirmative vote of all the Fellows present shall constitute an election, at least fifteen Fellows being present. The names of any candidates not nominated by the Council or not elected by the Society shall be placed upon a waiting list and shall be reconsidered by the Council at each succeeding meeting. When the name of the candidate is placed upon the waiting list a copy of his paper shall be returned to him for publication if he so desires, but any such candidate shall have the privilege of submitting another paper to the Council a month before any succeeding annual meeting. A list of all the candidates, accompanied by all the information sent to the Council, shall be sent to every Fellow with the notification of the annual meeting.

No one shall be eligible for Active Fellowship until he shall have submitted to the Council a paper on some subject connected with gynecologic science.

HONORARY FELLOWS.

IV. The power of nominating Honorary Fellows shall be vested in the Council.

The election shall take place in the same manner as that of ordinary Fellows.

They shall enjoy all the privileges of other Fellows, but shall not be required to pay any fee or be allowed to hold any office, or to cast any vote.

Any member of this Society at the end of twenty-five years' active service in the Society, or at any time thereafter, at his own request, shall be placed on the roll of Honorary Fellows, and shall be so classified in the next volume of TRANSACTIONS, provided the request be made during the fiscal year for which the annual dues have been paid by that member.

OFFICERS.

V. The officers of the Society shall be a President, two Vice-Presidents, a Secretary, and a Treasurer, all to be elected annually, who, with four other Fellows, one to be elected each year for a term of four years, shall constitute the Council of the Society.

The nomination of all officers shall be made in open session at the business meeting, and the same shall be elected by ballot.

The officers shall enter upon their duties immediately before the adjournment of the meeting at which they were elected, and shall hold office for one year.

Any vacancy occurring between the annual meetings shall be filled temporarily by the action of the Council.

All officers shall be eligible for re-election.

ANNUAL MEETING.

VI. The annual meeting of the Society shall be held regularly on the fourth Tuesday in May, and shall continue for three days, unless otherwise ordered by vote of the Society at any executive session.

AMENDMENTS.

VII. This Constitution may be amended by a two-thirds vote of all the Fellows present at an annual meeting, provided that notice of the proposed amendment has been given in writing at the annual meeting next preceding, and that the same has been printed in the notification of the meeting at which the vote is to be taken.

BY-LAWS.

PRESIDENT AND VICE-PRESIDENTS.

I. The President and Vice-Presidents shall discharge the duties belonging to their respective offices. The President shall be *ex-officio* chairman of the Council.

SECRETARY.

II. The Secretary shall attend and keep a record of all the meetings of the Society and of the Council, of which latter he shall be *ex-officio* clerk.

At each annual meeting he shall announce the names of all who have ceased to be Fellows since the last report.

He shall superintend the publication of the TRANSACTIONS, under the direction of the Council.

He shall notify candidates of their election to Fellowship.

He shall send notifications of the annual meetings and of the meetings of the Council.

TREASURER.

III. The Treasurer shall receive all moneys due and pay all debts. He shall render an account thereof at the annual meeting, when an Auditing Committee shall be appointed to report.

COUNCIL.

IV. The Council shall meet as often as the interests of the Society may require.

Five members shall constitute a quorum.

It shall have the management of the affairs of the Society, subject to the action of the Society at its annual meetings.

It shall arrange the order for the reading of papers at the annual meetings.

It shall not have power to make the Society liable for any debts exceeding in total one hundred dollars in the course of any one year, unless specially authorized by a vote of the Society.

It shall have the entire control of the publications of the Society, with the power to reject such papers or discussions as it deems best.

The President, or any three members, may call a meeting, notice of which shall be transmitted to every member two weeks previous to the meeting.

The Council shall determine questions by vote, or—if demanded—by ballot, the President having a casting vote.

The Council shall constitute a Board of Trial for all offences against the Constitution and By-laws, or for conduct unbecoming an honorable physician, and shall have the sole power of moving the expulsion of any Fellow.

ORDER OF BUSINESS.

V. The Order of Business at the annual meetings of the Society shall be as follows:

I. General meetings at 10 A.M. each day.
   1. Reports of the Committees.
   2. Reading of Papers and Discussion of the same.

II. The Business Meeting, at which only Fellows of the Society shall be present, shall be held on the second day of the session, at an hour determined by the Council and announced on the program of the meeting. The Secretary's Record shall then be read; the Treasurer's accounts be submitted; the reports of Committees or other than scientific subjects be received; and all miscellaneous business be transacted.

PAPERS, ETC.

VI. The titles of all papers to be read at any annual meeting shall be forwarded to the Secretary not later than *two weeks* before the first day of the meeting.

No paper shall be read before the Society which has already been printed or has been read before another body.

All papers that may be read before the Society, and accepted for publication, shall become the property of the Society, and their publication shall be under the control of the Council. Such papers may be published in full in medical journals, provided that they are also printed in the TRANSACTIONS.

QUORUM.

VII. A quorum for business purposes shall be fifteen Fellows.

DECORUM.

VIII. No remarks reflecting upon the personal or professional character of any Fellow shall be in order at the annual meetings, except when introduced by the Council.

ASSESSMENTS.

IX. Every Fellow shall pay in advance the sum of fifteen dollars annually.

Any Fellow whose subscription shall be more than nine months in arrears shall be reminded of the fact by the Treasurer in writing; in event of payment not being then made, he may, on vote of the Council, be dropped from the Society.

Each Fellow shall pay on admission an initiation fee of twenty-five dollars.

Any Fellow who shall neither attend nor present a paper for three successive years shall, unless he offers an excuse satisfactory to the Society, be dropped from Fellowship.

AMENDMENTS.

X. Any of these By-laws may be amended, repealed, or suspended by a two-thirds vote of the Fellows present at any meeting, *provided* previous notice in writing has been given at the annual meeting, immediately preceding the one at which the vote is to be taken.

PAPERS

READ AT THE

THIRTY-SECOND ANNUAL MEETING

OF THE

AMERICAN GYNECOLOGICAL SOCIETY,

HELD AT

WASHINGTON, D. C.,

MAY 7, 8 AND 9, 1907.

THE PRESIDENT'S ADDRESS.

PROPHYLAXIS OF VENEREAL DISEASE FROM THE STANDPOINT OF THE GYNECOLOIST.

By Clement Cleveland, M.D.,
New York.

It is with a feeling of profound gratitude that I acknowledge the honor done me by your great kindness in electing me to occupy the position of President of this Society. It is especially gratifying to me to feel that I hold the position once honored by my great revered teachers—Sims, Emmet, Thomas, and Peaslee—to whom especially I owe the inspiration of my professional life; not these alone, but the other great names whose memory we cherish and whose deeds have made the Society famous.

It is proper at this point that I should refer to the loss we have sustained in the death of our distinguished friend and fellow member, Fernand Henrotin. It is but a few short months since he was with us in full vigor of mind and body. He was of that type of open-hearted manhood, combining many engaging personal qualities, which made him pre-eminently popular, and as beloved as he was eminent. Our acquiescence in the just order of Providence alone tempers the solemnity and sorrow with which we regard his departure from life. But I must leave to another the duty of portraying his life and career in suitable memorial.

It appears to me as not unseemly that I should just here allude to a matter that is of great importance to the well-being of the Society. I would especially call your attention to the necessity of full attendance at our meetings. The papers read before this Society are, presumably, prepared with the greatest care, and express the mature convictions and best thoughts of the authors. Although the members come to the meetings for pleasure and profit, it is often at great personal sacrifice and because of a duty they owe to the Society and to each other. Every man feels, when he reads his paper, that it would be a most agreeable pleasure and encouragement to have a full attendance. Indeed, is it not a respect we owe to each other? It is earnestly hoped that each one of us will take this home to himself and follow the precepts of the golden rule.

I will now take up the subject matter of the address that the office of President of the Society calls for, which is, "The Prophylaxis of Venereal Disease from the Standpoint of the Gynecologist."

You are all aware that there is a movement on foot throughout the civilized world for the suppression of the "Social Evil." In making choice of a theme upon which to address this Society, I was influenced by no expectation of being able to add new thought to the discussion of this question, but by a desire to stimulate and help to keep alive our interest in it. Surely it is one in which men of our branch of practice must feel a peculiar interest. The position of the gynecologist regarding venereal disease is one of greater enlightenment than that of his brother of the general profession, because of his greater opportunity for observing it. His responsibility is, therefore, proportionately greater. From gynecology has come all the present-day knowledge of the effects of gonorrhea in women, and the inspiration for all that is known of its lasting effects upon men. It is being said of us, however, that we are expending all our energies of mind and crafts-

manship in remedying the evil results of these diseases and paying little or no attention to methods for their prevention. Whether there is truth in this or not need not particularly concern us. The fact is, we are in a world that is astir on this question, which is a vital one, and it is incumbent upon us to keep our Society in the forefront in all that tends to the betterment of the race.

Our individuality is clearly defined. We are recognized as the representatives of certain principles, certain influences, certain tendencies, certain vital facts. Thus it is that this Society stands as one of the great forces to which to appeal in such a humanitarian effort. Individually every member is deeply interested in this movement, and I believe that every one is satisfied that it would be well for this Society, as a society, to take some positive stand and make some concerted move to show that we are in hearty sympathy with its aims.

At the first meeting of this Society, which was held in New York in September, 1876, Dr. Noeggerath read a paper on "Latent Gonorrhea," which was a supplement to a paper on the same subject published by him, in the German language, in 1872. His suggestions were so new, and so contrary to the prevailing opinions of the time, that they were looked upon with distrust, and he goes on to say in his second paper, "I now find, however, the subject of latent gonorrhea gradually making its way into most of the gynecological hand-books and treatises of recent date, both here and abroad." All who knew Dr. Noeggerath admired and respected him for his great learning as a physician and scientist, and as a conscientious, scrupulously careful observer and investigator. He was one of the really erudite men of the time. He waited ten years after he first made his discovery before he made it known to the profession, and not until he was sure of his ground. With all the advance in the physical sciences he had not been able to bring forth a direct proof of its existence. He had hoped to find the solution of the problem in the presence of a fungus

peculiar to women affected with latent gonorrhea. He did not follow it up chiefly because he discovered the same fungus in discharge from very young children.

I think most gynecologists at the time accepted his views as true, though they were not prepared to verify them by their own experiences. They certainly saw that they explained many things that, without them, were mysterious. Three years later, in 1879, came the discovery of the gonococcus by Neisser, which established, beyond the possibility of doubt, all that Noeggerath had contended for.

In laying the paper before the Society for discussion Dr. Barker, the President, among other things, said: "If these views are true, a modification of the paper should be found in every Sabbath-school library throughout the land." This was not said in a flippant or jocose spirit, but with deep, sincere conviction. It showed that what was uppermost in his mind was that something should at once be done to protect the children of the land, and he instinctively turned to the teachers of morals and religion.

Thirty years have passed since the reading of this paper, and the ideas then promulgated have long been accepted as sound gynecological doctrine.

The most notable treatise upon this subject is from the pen of Dr. Prince A. Morrow, entitled *Social Diseases and Marriage.* It is so well conceived, so full of startling facts, and written with such scholarly grace and diction, that it should be read by everyone who desires to be informed upon this subject.

Of venereal morbidity Dr. Morrow says: "Its prevalence escapes recognition and must always remain an unknown and unknowable quantity. This is due largely to the shameful character of these diseases, in popular estimation, and their difficult and baffling character, as a sanitary problem. Venereal diseases are entirely ignored by our sanitary authorities."

We know, however, that gonorrhea is the most widespread

and universal of all diseases of the adult male population, embracing 75 per cent. or more. Noeggerath stated that of every 1000 men married in New York 800 have, or have had, gonorrhea, from which the great majority of wives have been infected.

While gonorrhea is insusceptible of hereditary transmission, its influence as a depopulating factor is scarcely less pronounced than that of syphilis, from its inhibitory influence upon procreation. Neisser contends that gonorrhea is a more potent factor in the depopulation of countries even than syphilis. He regards gonorrheal infection responsible for more than 45 per cent. of sterile marriages. When the vast number of childless couples in this country is considered we can appreciate the agency of this one factor alone as a cause of depopulation.

It has been computed that from 20 to 30 per cent. of blindness in this country is caused by gonorrheal infection. A large proportion of blindness occurs as a result of purulent conjunctivitis in children infected at birth.

It is no exaggeration to state that every year in this country thousands of young men carry to the marriage bed the germs of disease, destined to wreck the health and lives of the wives and children.

It is not because men are so lacking in conscience or sensibility that they perpetrate these crimes against the women they have vowed to love, cherish, and respect, but it is largely from ignorance, from false and erroneous ideas of the dangerous nature and far-reaching consequences of these diseases, and for which the medical profession is in some degree responsible.

These statements of Dr. Morrow are the result of most careful study and painstaking investigation, and are accepted by the vast majority of the profession as well within the truth. They carry with them lessons that are terribly emphatic and should be taken to heart by everyone. The most harrowing

part of this revelation is that the greatest sufferers are women and children, the victims of a scourge they have no hand in creating.

We know from the statistics gathered from other lands besides our own, and from our individual experiences in dealing with the results of these diseases, how extensive the consequences are. Man does not escape from the serious effects of gonorrhea, but owing to advanced methods of care and treatment he is less likely to feel permanent after-effects. He is more susceptible to cure, while in woman, in the vast majority of cases, the effects are never entirely eliminated. Man usually escapes with his life, while many women die, and many are ruined for life. It is computed that fully 70 per cent., and it is probably greater, of all gynecological operations are necessitated by the effects of gonnorrhea. In a large percentage of these cases the uterus and adnexa have to be sacrificed.

No argument is necessary to convince the members of this organization of the importance of arousing the public to a realization of what all this means to race perpetuation. The question of low birth rate has already assumed the importance of a national problem.

The statistics that have been collected do not take into account the vast number of untreated cases. It is a well-established fact, as Dr. Morrow states, that "there is no class of diseases so serious in their direct and ultimate effects upon the health of the individual which are so apt to remain untreated." In those sections of New York City known as the East and West sides, where the population is the densest in the world, where people of all nationalities are huddled together like swine, and in similar sections of all large cities, here it is that these diseases are thriving in their most virulent form. With the present hospital and dispensary facilities they are practically inaccessible. Here are to be found the greatest number of acute and untreated cases, and they are

being added to every day by the hordes of emigrants entering our ports. Someone has said: "Our country seems to be the mecca of crooks and everything that is bestial." They are the sources from which the contagion will continue, chiefly, to develop and spread, and must, unchecked, nullify most of the work done elsewhere. Prompt treatment is what is required for such cases. It shortens the period of contagious activity, and is one of the most powerful allies of prophylaxis. Thousands of cases of infection can be traced to one untreated case.

There is but one general hospital in the city of New York where these diseases are admitted in the acute stage—the City Hospital on Blackwell's Island. All others refuse them. This apparently is not from a spirit of indifference on the part of the hospital authorities, but rather from a policy established on sentiment, prejudice, conventionality—call it what you will—an unwillingness to admit that they do not receive such diseases to their wards. Yet, after the acute stage is past, and operable results have been established, they are admitted under ambiguous titles. There was the same objection, a few years ago, regarding cancer cases; but that prejudice was overcome and they all receive operable cases of that disease.

All general hospitals must be persuaded to receive the acute cases of this disease, and greater dispensary facilities must be established. It is impossible to describe, or even to imagine, the depth of degredation of these densely populated districts, made up as they are of foreigners of the lowest types, where the sacredness of childhood, even, does not count. Rape, incest, and sodomy are of daily occurrence, and the acts which others perform in private these people often practice in the presence of their children. The standards of morality do not exist. After all what else could be expected? Social conditions are such that there can be no such thing as privacy. They are forced, or force themselves, to live like the beasts.

Imagine, if you can, a family of six or eight living in two or three rooms, and feeling obliged to take boarders besides. And yet this is no exaggeration. Crimes against children, many of them of extreme youth, are of frequent occurrence, and the majority of these never reach the ears of the Society for the Prevention of Cruelty to Children. Dr. Travis Gibb, Examining Physician to that Society, reports that out of 800 girls upon whom it was alleged rape had been committed, he found 117 cases of venereal disease, the ages of the children ranging from three to sixteen years: He says: "In spite of this large number of cases which have been brought to the attention of the Society, I am of the opinion that they are but a small proportion of the cases of sexual crimes against children, which actually occur in our city."

Ignorance is the dominant factor in the situation, supplemented by prejudice, indifference, and neglect. What are the methods best adapted to cure this great public evil? Law has ever been man's recourse against wrong. Naturally in such an extremity as this his thought first turns in that direction. But law is merely the expression of public opinion, and it is impossible, in this instance, to procure the passage of a law until public sentiment, sufficient to demand it, has been aroused. A law, moreover, without public backing is ineffectual.

The profession is now fairly informed regarding the extent and danger from venereal disease. The public, however, is still profoundly ignorant and, as a rule, regards gonorrhea as a trivial affair, easily cured and leaving no after-effects. In fact, among the working classes the ignorance is as dense as it was thirty years ago. The reason for this is not far to seek. Among all classes there has always existed an unpersuadable prejudice against speaking of or recognizing the existence of such diseases. It is a prejudice handed down from the distant past, and would seem to be quite insurmountable. This prejudice must be overcome before it would be possible

to enact any law that would help the situation. We should be under no illusion in this regard.

A fairly general conclusion seems to have been reached that, at present, legislation would be of little avail. There are some who favor the regulation of prostitution, as is done in France and elsewhere in Europe. But public opinion in this country is so positively opposed to licensing such practices, that a struggle to obtain it would be useless at present, and would be a waste of energy that would be better spent in other directions. Moreover, the regulation of prostitution in France has not been a great success and is likely to be abandoned in the near future. It has been found that the prostitutes who can be reached by the police number but a small percentage of the total. The so-called private, or clandestine, prostitutes outnumber the public 100 to 1 or more. Moreover, the men who are spreading the disease to a greater extent than the prostitutes cannot be reached at all.

In the past thirty years innumerable papers have been written upon venereal diseases and their results, but these papers were read before bodies of medical men and then relegated to forgetfulness, never reaching the public ear. Why so many years were allowed to elapse, after the evil effects of gonorrhea were known, before any decided move to suppress it was organized is difficult to fathom. It is easier to understand some things than to explain them. But it is useless, however, to seek for causes and explanations except in so far as they may serve to prevent future mistakes. It is enough for us to realize that a great responsibility rests upon the medical profession. Upon it devolves the necessity for leadership. The people must be enlightened and we must lead the way. The opportunity is a grand one and we should seize it with enthusiasm and determination. It is not expected that syphilis and gonorrhea can be entirely eliminated. That they can be checked and held in abeyance, but few doubt. It is confidently believed, however, that marriage can be pro-

tected and that blindness from gonorrheal infection can be eradicated. Surely such a result alone is worth all the effort that can be put into it. There is no question of the necessity of education. There seems to be no one who doubts the importance and urgency of it.

The responsibility, however, of enlightening the public does not rest with the medical profession alone. We cannot undertake the task unaided. It is not a medical or sanitary problem merely, as the causes are dependent upon social conditions beyond the control of the physician.

By constant study and agitation the best methods for reaching the people will be evolved. It is considered most important that all medical schools should pay the greatest attention to instruction in venereal diseases and their consequences, and some are doing so. The student and physician cannot be too often reminded of the responsibility that rests upon him, not only in the treatment of these diseases, but in his prognosis and sanction of marriage. Many thousands of young men with a gonorrhea uncured, marry, and with the sanction of their physicians, who, perhaps, have not been as careful as they should have been in giving approval. He must constantly teach the infected man that he is infectious and thereby dangerous. I dwell on these points because of their vast importance, not merely to the race but to the reputation and influence of the profession.

The work is already being taken up by philanthropic institutions. All educational institutions, colleges, seminaries, schools, should have in their curricula courses upon sexual physiology and hygiene, and the instruction should be as much a matter of course as that on any function or portion of the body. Some already have these courses established, and all will doubtless follow suit in the near future. Many religious bodies are beginning to show awakening interest, which is a most encouraging sign. University settlements, church settlements, and so-called neighborhood settlements,

are among the many places where lectures and talks can do a vast amount of good. There are over 100 social settlements in New York City.

The Charity Organization Society of New York has found the labor unions for the past three years taking a hand in the struggle against tuberculosis that must have great effect in that great problem. Knowledge of this disease is being presented to the unions by short lectures, some of them illustrated by stereopticon views. Surely what can be done before the unions for tuberculosis, it should be possible to do for gonorrhea and syphilis.

The situation as to methods, however, is fraught with difficulties and perplexities, and they hinge chiefly upon the morbid hesitancy to talk openly and frankly of sexual matters.

It is the opinion of those who have given most thought to the matter, that by speaking frankly and openly, by calling things by their right names, the greatest progress can be made. Great good has come from publicity and it is popular. It is said advantage should be taken of it to educate the people in all that relates to venereal disease. But the cry has ever been: "Such things are unspeakable, and should not be talked about." In exposing indecency it is not necessary that we ourselves should be indecent. There is a way of telling unwholesome truths and exposing evils that are unsavory without being vulgar. Shall we shut our eyes to the facts of life or is it better to face them? There is no moral gain when a euphemistic description, of which everyone sees the meaning, is employed and explicitness omitted. Suggestiveness is more injurious than plain statement. Is it not better to tell the plain, unvarnished facts than to tell the same story in paraphrase, that necessarily arouses prurient imaginings?

Someone has said: "There is a popular instinct that creates an overwhelming demand for the ungarbled truth. May it not be assumed that there is a sound moral basis for it?"

Conventionality may have claims, but unquestionably morality is promoted by publicity.

For myself I am positively of the conviction that we should not play over the surface of the subject, but should get right down to the foundation of the matter and display it in all its ugliness. In this way only can we have any hope of making our influence felt, and expect to reap any moral advantage.

The American Society of Sanitary and Moral Prophylaxis was started in 1905, with headquarters in New York City, and there are similar societies in Chicago and Philadelphia.

It consists of members of the medical profession and of the laity, including women. It holds bimonthly meetings, omitting the months of June, July, August, and September. Dr. Prince A. Morrow is the president. Its purpose is defined in the second article of its constitution, as follows: "The object of the Society is to limit the spread of diseases which have their origin in the social evil. It proposes to study every means, sanitary, moral, and administrative, which promises to be most effective for this purpose."

The parent society was founded in Paris, in 1900, by Professor Fournier, and there are now similar societies in other countries. These societies form the backbone of the movement and are to be looked to as sources of information and advice. They are composed of earnest philanthropic men and women.

In France they enjoy some advantages that we have not yet been able to secure. In the first place, they have several years the start of us; these subjects have never been so completely tabooed as with us; they are more openly discussed. Moreover, they have had the influence of the public press almost from the start. Now and then a few short sentences have been published in one of our daily papers, with more moral courage than the rest, commending the work of the American society. Coming events cast their shadows before. Such little signs indicate the possibilities of the future. When

we have created the public opinion demanding more information, the newspaper press will be quick to respond. They always give what the public wants.

There is already a great awakening in France. The people have begun to discuss the subject. Their eyes are opening rapidly to an appreciation of the dangers of venereal disease. Is it to be supposed that the American people are less susceptible to the same kind of teaching?

Boards of health are entirely inactive regarding this question and no arguments will move them. They have a vast amount of machinery which could be made available for help. Witness what they have done, and are doing, for the suppression of infectious and contagious diseases, such as smallpox, cholera, and tuberculosis. Moreover, they could be of the greatest help in distributing information in the way of literature on this subject, tracts, leaflets, etc. But in this instance they are not entirely to blame. The medical secret prevents the reporting of venereal infections, though the law requires the reporting of other infectious diseases. The physician cannot betray the confidence of his patient. The profession could, however, as Dr. Morrow has suggested be required to report these diseases with dates, but without names, and the Board of Health to tabulate and publish them. This would do away with all objection on the part of the public, and at once be of immense advantage to scientific research, and of the greatest help in calculating the approximate prevalence of these diseases.

To overcome indifference and arouse an urgent public sentiment in favor of the movement, there is no more powerful argument than the fact that the greatest sufferers from these diseases are innocent women and children. Constant preaching of this one fact alone will gain more supporters for the cause than all others combined. It compels a sympathy that must reach the hearts of the most stolid. The fact that guilty men and women have to suffer for their sins, does not

appeal to public sympathy, and gains hardly more response than that "It serves them right." When the public is made to believe these facts, and realizes the significance of them in the fearful martyrdom of women and the blighting of the lives of countless numbers of children, then may we look for an effective working of this crusade.

There is a morbid hesitancy on the part of mothers and fathers to talk of sexual matters to their children. It is either from a want of moral courage or fear of doing harm. The mother hesitates to talk to her child upon such subjects, because she wants to keep the child innocent. Innocence and ignorance are not synonymous terms. Innocence means freedom from moral wrong. There is no fact in life the knowledge of which can make a good woman immoral.

It is claimed by everyone who is giving thought to the matter, that instruction should begin early in the home; that parents should strive more to make companions of their children, gain their confidence, and always keep in close touch with them. It is quite apparent that children of all classes, at a very early age, recognize the difference in sex, and very early acquire a knowledge of its significance. It is to a great extent intuitive. But the youthful mind is keen and receptive. The thirst for knowledge develops very early. Information is picked up from chance remarks of their elders and added to by the wise ones among their companions. The result is that children, uninformed by parents or teachers, regarding the purposes of the sexual apparatus, grow up with erroneous ideas regarding it, the sensual predominating. The fundamental facts of the physiology and pathology of the generative organs are all that the parent needs to know in order to bring up the child safely.

But the father and mother often require as much education as the child. The father and the mother, generally, know the meaning of the moral law, and instinctively a woman knows that she must protect her virginity. But what does a child of

nine or ten know, if uninstructed? And yet this is the age when children are picking up wrong information and forming perverted ideas regarding the relation of the sexes. There is a child lore upon these subjects that is very general among school children. There is abundance of evidence to show that small boys talk to each other on these matters and that girls do the same. There are children often born of youthful parents, outside the marriage bond, where the generative animal instinct alone had brought the two people together. It was not viciousness; they knew no better. They had never been taught the consequences of the act. Such instances are not infrequent. It is clear, therefore, that youthful minds should be guided into right channels, at a very early period, whenever the receptive moment appears for which the parent or teacher should be on the watch.

The chief sources of prostitution are the laboring classes, factories, and shops supplying the largest quota. The young women of these classes, therefore, need education in sexual matters more than all others, if they are to protect themselves and preserve their purity. All women know intuitively that this is incumbent upon them, but they do not know the probable consequences of lapses from virtue. Their education, however, cannot be a difficult matter. Already they have been lectured to by both men and women physicians, and in every instance where the experiment has been tried, they have listened with deep interest and attention, and have manifested a responsive eagerness for all the knowledge that could be given them. Lectures and short talks are now being given to young women in small groups, in some of the social settlements in New York, with encouraging success. This method of reaching the young women of the working classes will undoubtedly be taken up by the social settlements in all our large cities.

The problem of educating young men is a more serious and difficult one, because of certain fixed and traditional

ideas. It is a prevalent notion in the minds of young men that sexual intercourse is necessary to health; that if a man cannot marry he must get relief in some other way; that there is a waste product that he must be relieved of in order to retain his health and mental vigor. All this is traditional assumption and not substantiated by facts. There are many men who live absolutely continent lives and never know a woman in a sexual way until they are married, and yet remain vigorous in mind and body. Moreover, it is an established fact that it is not the man, strong in mind and body, who finds the indulgence a necessity, but the man who has weakened his reproductive organs by frequent or excessive exercise of them. Not only does he look on it as a necessity, but claims it as his right, and society does not condemn him. This, of course, is not as it should be. There is no justice in man's demanding of woman a chastity he will not practice himself. There should not be two standards of morality, one for man and another for woman. Farther than that, there are no facts to sustain the claim that sexual indulgence is a necessity for man any more than it is for woman. We know it is not a necessity for woman. A virtuous woman waits until she is married; man can and should do the same. He must be convinced of this and that continence is conducive to health, as is believed, by a majority of the medical profession. This is, of course, leaving out of consideration the moral aspects of the question. The arguments, to be convincing, must be based on the ground of physical health alone.

It is feared that little headway will be made with young men until they have been set right on this point. It may require some practical lessons to bring about a revulsion in their attitude regarding this phase of the question. These lessons must come. I have said earlier in this paper that it is believed that marriage can be safeguarded. It is entirely in the hands of parents and guardians, whether they will or not decide to take a positive stand and demand of young men a certificate

of freedom from venereal disease, signed by a reputable physician, before giving consent to marriage. What father, who loves his child and regards her safety, and knowing these facts, could give her to a man who would decline to secure such certificate? Any young man conscious of his rectitude will welcome the opportunity to prove it. On the other hand, one who declines to do so, at once condemns himself as unfit for the marriage relation. This would, of course, produce much unhappiness. But it is an axiom of political economy that what appears as the good of the individual must be sacrificed for the good of the many. In the end lasting good would be accomplished. The knowledge among young men that a certificate of this kind will be required if they desire to marry, will keep most of them in the paths of virtue. It may at first increase the number of bachelors, but in that the race will be the gainer, if, as is most likely, the majority of them will be infectious men.

To prevent disease will always be the highest aim of the profession. To repeat what I have said before, the responsibility bears heavily upon the medical profession, and most heavily upon our branch of it. The facts regarding the prevalence and results of these diseases are better known by us than the general profession. As we look back upon these thirty or more years, and, knowing what we do, the marvel of the thing is, why we have not bestirred ourselves long before this to start in motion all the machinery that can be devised for checking the advance of this great peril. But the thing for us to do now is to wake up to a realization of what is before us to join hands with all the forces now already at work, and even to take a position in advance of others, if, peradventure, that can be done. Individual members of the Society have already been active in the matter; some have written admirable and stirring papers, and some have joined the American Society of Sanitary and Moral Prophylaxis. The Society, however, as a unit, has not taken a stand on the ques-

tion, which the times and its overexalted position would seem to demand. The Society has done great work, has become famous, and it is our duty to see that it retains its prominence. This cannot be done merely by writing papers on special subjects and holding annual meetings. It must take an active interest in all philanthropic movements in which the profession is embarked, and particularly such as the present one.

Let us arouse ourselves, then, and give aid and sympathy to a movement which requires all the effort that can be commanded. Let every member affiliate with some society already started, or take steps to form societies in places where they do not now exist.

Moreover, would it not be well to have a standing committee to report each year, to arrange for papers in symposium, to invite prominent men, such as Dr. Morrow, for instance, to read papers before us, or in other ways to make prominent the vital interest we all feel. By so doing we will acquit ourselves of any charge of inactivity, and at the same time have the satisfaction of feeling that we are doing our share in helping on the good work.

We cannot, of course, hope for the realization of Sir Thomas Moore's ideal commonwealth in the island of Utopia, but we shall have done something to avert the damnation which overtook Sodom and Gomorrah.

METASTATIC CARCINOMA OF THE TUBE AND OVARY IN CANCER OF THE CERVIX UTERI.

By Fred. J. Taussig, M.D.,
St. Louis.

The literature on squamous-celled carcinoma of the cervix uteri, as Cullen points out, contains very little bearing on the condition of the tubes and ovaries in this disease. The following case may serve to present a few additional facts, together with an illustration of a rather unusual form of cancer metastasis along adhesive bands.

The patient from whom the specimen was obtained at autopsy in the St. Louis Skin and Cancer Hospital was a woman aged forty-two years, who, as the history indicated, developed a cervical cancer during her last pregnancy, two years before. A positive diagnosis was not made until six months prior to her death, and by this time the parametrium and bladder were involved so far as to render the case inoperable. The postmortem showed the peritoneum, parietal and visceral, smooth and shining; no adhesions except for a few bands running from both adnexa to the posterior cul-de-sac. No carcinoma in any abdominal organs; no ascites. Both ureters showed some dilatation as a result of compression by the cancerous infiltration in the broad ligaments. The pelvic organs were removed en masse. The cancer was found to have formed a large crater in the cervix. The infiltration involved both vaginal walls, the bladder anteriorly and the rectum posteriorly. At the internal orifice

of the uterus the infiltration had produced a constriction, with a resulting small pyometra. The gross specimen gave no evidence of any spread upward beyond the cervix. Upon the left ovary there was found, on closer inspection, a hard nodule, the size of a pea, elevated above the surface. An adhesive band, about 2 mm. in thickness, ran from the edge of this nodule to the cul-de-sac. A similar, somewhat more slender, adhesive band, running a parallel course, was found going from the right ovary to the cul-de-sac. Just above the point where this second band was attached to the right ovary there was seen a second minute nodule, the size of a pinhead. The left tube was normal in every way, and non-adherent. The right tube was thickened by chronic inflammatory processes, and adhesions ran from it to the surrounding structures. Its fimbriated end was closed. A section through the thickened abdominal end of this tube showed an induration the size of a hazelnut, extending from the serosa through the entire wall to the mucosa. The cancerous infiltration of the posterior vaginal vault extended directly beneath the periosteum of the cul-de-sac, and it was to this point that the above-described adhesions were directed.

Microscopically, the cervical cancer was found to be squamous-celled. The nodules in the ovaries and in the wall of the tube were cancer of the same type. This fact, together with their size and their relationship to the infiltration posteriorly, compels us to interpret them as metastases.

The entire adhesive band on the left side was examined in serial sections, to determine whether or not the involvement of the ovary was by continuity. The band was found entirely free of cancer, but contained a plentiful supply of lymph- and bloodvessels. Apparently, therefore, metastation had taken place by way of the lymphvessels of the adhesive band, and not by direct growth of the tumor. As the adhesive band on the left side contained a small amount of adipose tissue,

together with a lymph node, it was in all likelihood originally a bit of adherent omentum that had later become snared off. That the adhesions preceded and did not follow the metastases on the ovaries is evident from the fact that the adhesions ran up to the very edge of the metastasis without covering its top. In other words, they end just where the metastasis begins.

Rather surprising was the fact that the mucosa of the uterine body, which, on gross inspection, seemed like a pyogenic membrane, showed a diffuse but superficial squamous-celled carcinoma. This is in itself a most interesting and unusual circumstance. All trace of the original endometrium was gone. In its place was a pyogenic membrane, and diffusely infiltrating this membrane there could be seen the nests of cancer cells. These did not penetrate deeper than about 0.5 mm. into the muscular coat. The superficial site of the cancer metastases in tube and ovary shows that they stand in no relationship to the conditions in the fundus, but are secondary to the cancer of the cervix.

Involvement of the tube and ovary by direct continuity is not a rare occurrence. Littauer found it in 15 per cent. of autopsies done on patients with cervical cancer. Here the cancer spreads through the broad ligament, penetrating finally to the hilus of the ovary, or through the muscular coat of the tube. Another not infrequent mode of extension is by breaking through into the peritoneal cavity, there causing multiple carcinomatous nodules on the ovary and on the peritoneum of all the pelvic organs, intestines, etc. Much rarer are cases like the one I have described. Littauer, in 1891, found only 14 cases in which cancer of the uterus formed metastases in the ovary without involvement of the intermediate structures. Of these 14 cases, 12 were cases of carcinoma of the body, and only 2, carcinoma of the cervix. I have been able to find only a few additional reports. Amann observed a case in which an advanced adenocar-

cinoma of the cervix was associated with large metastases in the ovaries. As a hard mass was felt in the pancreas, it is of course possible that the latter was the primary seat of the trouble. Kroemer reported a case of primary carcinoma of the ovary causing metastasis in the cervix, and Amann, too, has seen a case of this sort. Borrmann saw a squamous-celled carcinoma of the cervix with multiple metastases in the walls of an ovarian cyst. Renault recorded the post-mortem findings in a woman who died of inoperable cervical cancer, and in whom the disease had spread (how is not clearly stated) to the left ovary. The tubes and the other ovary were normal.

Concerning metastatic carcinoma of the tubes, there is likewise a scarcity of reports. Cullen cited a case very similar to mine in which the cancer had spread from the cervix to the adipose tissue above the posterior vaginal vault. A single metastatic node was found in the wall of one tube. It is of interest that in this case likewise there were many adhesions. Florenzo d'Erchia, cited by Kroemer, found metastases in the walls of the tube in a case of carcinoma of the cervix. Gellhorn described a carcinoma of the tube combined with diffuse cancer in both cervix and body, as well as another case of general carcinosis of ovary, tube, and uterus, in which the primary site of the cancer seemed to be the body of the uterus. Kundrat and Hofbauer describe cases of primary cancer of the tube, with implantation on the mucosa of the fundus and cervix of the uterus.

The rarity of metastases in the tube is seen by the fact that in 80 cases of cervical cancer operated on in Wertheim's clinic, Kundrat was not able to find even on the most minute examination a single metastasis in either tube. These were all operable cases. On the other hand, metastases in the tube in inoperable corpus carcinomata are not by any means so rare. Kundrat found in 24 cases of cancer of the body, 2 in which a small nodule was present in the tube. Metas-

tases in the ovary following carcinoma of the body are also not infrequently met with. Without even a more careful search, I could find record of 39 cases in which metastases had occurred in either ovary or tube, subsequent to carcinoma of the uterine body. (Littauer, 12 cases; Funk, 4 cases; Reichel, 5 cases; Glockner, 3 cases; Amann, 4 cases; Stone, 2 cases; Cullen, 2 cases; Gottschalk, Loehlein, Kamann, Gellhorn, Sondheimer, each 1 case.)

Concerning the spread of a carcinomatous process, along the track of an adhesion, it should be stated that where such an adhesion causes the agglutination of two organs, it is quite common to have the cancer spread by continuity from one to the other. But it is undoubtedly very rare to see a cancer spread from one organ to another lying at some distance from it, by way of the lymphvessels of a connecting adhesion. In old adhesions this would not be likely to occur, but in the newly formed ones the lymph supply is ample to carry carcinomatous particles from one point to another along its track. Where the connecting adhesive bridge is a portion of the omentum, as seemed to be the case on one side in the specimen described by me, the opportunity for metastasis by the lymphvessels of the band is even more apparent. The absence of any mention of this subject in the text-books on pathology to which I was able to refer, would make it appear that such a process is extremely rare. I cannot help but believe that a closer study of our cases of carcinoma will occasionally reveal such a method of metastation.

Inflammatory changes in the tubes and ovaries associated with cervical cancer are the rule rather than the exception. Cullen found in 31 cases of squamous-celled cancer of the cervix that only 10 had normal tubes and ovaries. In some there were only adhesions. Hydrosalpinx, pyosalpinx, tuberculosis of the tubes, cystic degeneration of the ovaries, etc., were among the other conditions met with. In 3

instances the ovaries were affected by direct continuity from the cancerous growth, but all these were inoperable cases. In 6 specimens of adenocarcinoma of the cervix, Cullen found but 2 with normal adnexa. In none, although far advanced, was there any cancerous involvement of these structures.

I was able to make some few additional observations along this line. For some of the material, I am indebted to Dr. H. S. Crossen. There were 11 cases in all of cervical cancer in which the tubes and ovaries could be studied; 8 were operative specimens, 3 were obtained at autopsy. In 4 instances both tubes and ovaries were normal. Five times adhesions were found and three times a well-marked salpingitis. In 3 cases the ovaries were cystic. In 1 specimen the uterus had been removed vaginally for cervical cancer and the adnexa of one side left. Here the recurrent cancer had invaded the structure of the remaining ovary. The tube was not involved.

We may conclude, therefore, that mild chronic inflammatory conditions of the tube and ovary are frequently met with in cancer of the cervix. Whether this is merely a coincidence or not, I would be unwilling to say. On the other hand, cancerous metastases in these organs are extremely rare in cervical cancer. In fact, I could find no record of such metastasis in an operable case. In carcinoma of the body, however, they are not infrequently seen in tube or ovary, or both. Hence, it would seem logical to advise removal of both tubes and ovaries in every case of cancer of the body. If, however, the patient is still five or ten years from the time of the menopause, and the site of the cancer be in the cervix, the saving of one ovary would be attendant with practically no risk to the patient, and might relieve her of the disagreeable symptoms of the premature menopause. Since this can be done without interfering with the complete removal of the lymphatics directly tributary to

the cervix, I believe it logical to leave one ovary, or a portion of one ovary, in every operation for cervical cancer in a woman under forty years of age.

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DISCUSSION.

Dr. J. Wesley Bovée.—This is a very interesting subject. Metastasis in cancer of the uterus is by no means common, as we know that the process is usually one which spreads by contiguity, and as the disease spreads certain metastases occur. It only emphasizes the fact, when these cases are brought to our attention, that we are helpless in the treatment of cancer of the uterus; that in cases in which the conditions would ordinarily offer great hope of eradication, we will find metastases occurring in structures which we cannot remove. The result is that cancer continues unsuspected. At best, the treatment of cancer of the uterus is not hopeful, notwithstanding the claims of radiographers, the demonstrators of radium, etc., and those who do the most radical surgical operations.

I am a little surprised to learn that these metastases occur much more frequently from the body of the uterus than from the cervix, inasmuch as we know that the surgical treatment of cancer of the body of the uterus is more radical than that of cancer of the cervix, and that these changes are all the more rare, according to Dr. Taussig's paper, for the reason that his case was one of cancer of the cervix, and not of the uterine body. I am not prepared, however, in the present light of surgery of cancer of the uterus, to accept the suggestion of Dr. Taussig that it is safe to leave an ovary or even a portion of one in extirpation of the cancerous uterus. My own conviction is that the operation, if radical, should be just as radical as it can be, consistent with the saving of the life of the patient.

Dr. A. Lapthorn Smith.—I wish to report one case in connection with this paper, because it made a deep impression on me. Originally, the case was one of cancer of the cervix, vaginal hysterectomy having been done early by another surgeon, with every hope of the patient making a permanent recovery. The woman recovered from the operation, but came to me a year afterward with no sign of recurrence of the disease in the vagina, but with two distinct masses in the ovaries which could be readily felt. I considered it too late to operate, and she died a few months later. This case made such an impression upon me that ever since, when doing vaginal hysterectomy, I have always removed both tubes and ovaries. I do not think it is safe to leave a piece of an ovary or one ovary, when there is such a tremendous risk of recurrence of the disease.

Dr. Reuben Peterson.—This is an important paper, because the author has given us statistics which will be valuable in connection with operations for cancer of the uterus.

I wish to go on record as endorsing the sentiments of Dr. Bovée against the leaving of one ovary or a part of one in the radical operation for cancer of the uterus. It seems to me this is a step backward, and not in accordance with the progress that has been made in the last ten years in the treatment of cancer of the uterus. I am not at all convinced that the leaving of one ovary, after the removal of the uterus, helps the patient, so far as the menopausal changes are concerned. I have read all the accessible literature on this subject; and I have tried both methods in the treatment of my own cases; and I must confess that I have been unable to see much difference where an ovary has been left in and where it has been removed. Therefore, so far as my own experience is concerned, since I have seen no change whatever, I certainly would not leave an ovary in such a disease as carcinoma of the uterus. It is interesting to know that the ovary is more liable to be diseased in cases of carcinoma of the body of the uterus than in those of carcinoma of the cervix. But in such a disease as carcinoma of the uterus, whether of the cervix or body, we should take no chances, but should remove all the tissue liable to be the seat of the disease.

Dr. Walter W. Chipman.—I was interested in listening to the paper of Dr. Taussig, because of the clear manner in which the case was worked up, and that of itself adds materially to the value of his communication.

He has told us that the inflammatory adhesions had been sliced, and we all know what work and trouble such a procedure means. Throughout the whole length of the adhesions no cancer cells were found, and I gather also from the general drift of his paper that these adhesions were not sufficiently old to be non-vascular, and the adhesion being, as he described, vascular, edematous, rich in lymph, the wonder to me is that cancer cells were not found somewhere in its course.

I doubt very much if it is a wise thing to leave even one ovary or even the part of one in a case of cancer situated anywhere in the uterus. I can quite sympathize, however, with Dr. Taussig in his effort to explain pathologically the safety of such a procedure. We know it is true that the ovary is not in the direct path of the lymphatic distribution of the pelvis, and while it is not in that direct path, yet so great and so rich is the anastomosis that I think the leaving of an ovary or ovaries must always be a rather risky procedure.

Dr. Taussig.—I rather anticipated that most men would hardly agree with the advisability of leaving a portion of an ovary, but I believe, from our statistics, that it is a procedure that is not unsafe, and it is just as logical to advise the removal of the appendix as to advise the removal of the other ovary. The appendix is a useless organ; the ovary, at least in the opinion of some, helps to make the menopausal disturbances less severe in women under forty years of age, if left. It is for that reason, I believe, that we should not merely look at the thing from a purely anatomical position of the ovary, as lying near the uterus and as being taken easily away by operation, but view it from a pathological standpoint as an organ that is not affected, and that ordinarily in cervical cancer it is useful to the patient, and, therefore, in certain cases, should be left for the patient's welfare.

NEW METHODS OF VERSION IN TRANSVERSE PRESENTATION.

By A. F. A. King, M.D.,
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The methods of version I propose to consider involve the introduction of a new factor in changing the presentation of a child in utero, which I believe has hitherto received no recognition whatever in obstetric practice, namely, the factor of thigh pressure upon the external surface of the abdomen, induced either (1) by a squatting or kneeling posture, or (2) by manipulating the woman's lower limbs.

The method will, I hope, commend itself to your consideration, inasmuch as it presents nature's method—at least what I have been led to consider the method of nature—in preventing and correcting transverse presentations.

As a rule the processes of nature, when intelligently understood and correctly interpreted, are not susceptible of improvement by artificial processes. It need scarcely be added that the proposed methods are of necessity completely aseptic, since they involve no internal manipulation.

If any individual, while standing erect, will place his hand, or more especially the closed fist, in the neighborhood of Poupart's ligament, and then assume a squatting or kneeling posture, he will easily demonstrate the tremendous pressure to which the hand will be subjected by the thigh, when the latter comes in contact with the abdominal surface.

But this pressure will be still greater upon the enlarged

abdomen of pregnancy; and in a transverse presentation, as will be seen presently, it would especially impinge upon the projecting head of the child, in such a manner and direction, as to lift the head off of the shelf of the iliac fossa, over the brim, and into the pelvic inlet, thus rectifying the transverse presentation. Note that this rectification is still further promoted by the pressure of the other thigh upon the opposite side, which, however, is exerted in a different direction and location; in fact, in such a manner as to press upon the breech end of the fetal ovoid, and lift it upward and inward, over toward the ensiform cartilage and median line.

To demonstrate that this description is not pure invention on my part, designed to support the theoretical basis of this paper, which might seem supposable, let me at once accentuate the fact—not always recognized—that the act of squatting is not a symmetrical proceeding. As usually practised it does not bring the two thighs in contact with the abdomen in a similar manner. Very far from it. In the biophotograph I here present (Fig. 1)—and the same thing may be seen in the man who catches the ball behind the batter in a baseball game—it will be observed that in the act of squatting one foot is flat upon the ground and considerably in advance of the other, this other foot resting its toe end only on the ground and considerably in the rear of the former one.

On that side, where the foot rests flat upon the ground and forward, the corresponding thigh will press upon the abdomen obliquely, high up over the hypochondriac and upper lumbar regions, and over a quite large extent of surface. On the other side, where the foot is in the rear and resting only on its toes, the corresponding thigh will be more nearly horizontal and will exert pressure lower down, over a smaller surface, in the neighborhood of the inguinal and lower lumbar regions, and in a more decidedly transverse direction, that is, inward toward the median line. The direction of thigh pressure must again vary, and may be made to do so at will, by varying

FIG. 1.—Squatting posture. Left foot flat and forward.

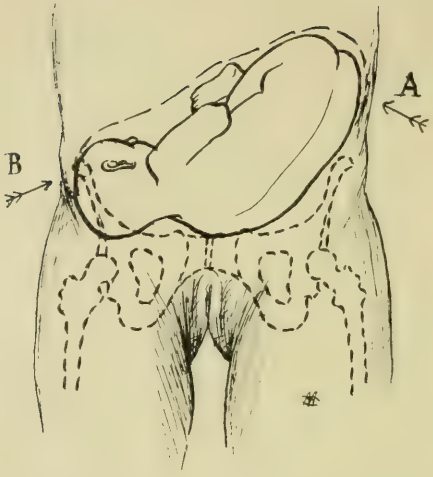

Fig. 2.—Left shoulder presentation. Head in right iliac fossa.

Fig. 3.—Squatting posture. For case shown in Fig. 2.

Fig. 4. –Right shoulder presentation. Head in left iliac fossa.

Fig. 5. –Squatting posture. For case shown in Fig. 4.

Fig. 6.—Symmetrical kneeling.

Fig. 7.—Unsymmetrical kneeling.

abduction of the thighs on the two sides. Some abduction is inevitable during the act of squatting in a near-term pregnant woman, from the protuberance of the enlarged abdomen.

To illustrate my meaning let us take a case of left-shoulder presentation, the back of the child directed anteriorly, the head being on the right iliac fossa, projecting somewhat in front of, and external to, the anterior spinous processes of the ilium, as shown in Fig. 2.

If now the woman plant her left foot flat upon the ground and somewhat forward, while the right foot rests on its toes, considerably behind the other one, and then assume a squatting potsure, as in Fig. 3, see what takes place. At once the knees separate owing to abduction of the thighs, and as the squatting becomes complete the left thigh comes in contact with the abdomen, and presses upon it over a large surface, high up, upon that region of the uterus where the breech end of the fetal ovoid lies. The direction of pressure on this side will, therefore, be obliquely upward and toward the median line, as indicated by the arrow, marked *A*, in Fig. 2; while in the opposite right limb with its foot poised on the toes and posterior to the other one, the thigh-bone being more nearly horizontal, will produce contact and pressure over a more limited region of the abdomen lower down, in line with the arrow, marked *B*, in the same figure, and impinge chiefly upon the projecting cephalic pole of the fetal ovoid in such a manner, and in such a direction, as to force the head somewhat upward and inward toward the median line, thus shifting it from the iliac fossa to the pelvic brim.

If to the pressure of the two thighs, thus exerted simultaneously in the two directions stated, we add the rectifying influence of labor pains—the uterus tending to straighten itself by contraction, and thus swerve the breech from its oblique position over to the median line—I say, if we combine the two forces of thigh-pressure and labor pains, either alone perhaps being inefficient, it seems almost impossible that a

transverse presentation could persist for any considerable time.

It may here be interesting to note, parenthetically, that the pregnant primitive woman, in a state of nature, daily subjects her fetus in utero to the influence of thigh pressure, in the manner stated, whenever she assumes the squatting posture during defecation, while in the civilized woman, enthroned upon the seat of her modern closet, no such rectifying factors are in evidence, for the two thighs, equally horizontal and at about right angles to the spine, press symmetrically inward on each side. In this way, perhaps, may we partly account for the alleged comparative infrequency of transverse presentations among uncivilized peoples.

But to resume: it may be asked, Why use these new methods of version, while the correction of a shoulder presentation is so easy by manual palpation in the process of external version, as usually practised?

I reply: External version by abdominal palpation is only easy under favorable conditions. Under opposite circumstances it often fails, and the operator must resort to the bipolar or internal methods, always with some risk of infection and uterine rupture. In the difficult cases, with discharge of the liquor amnii, rigid uterine contraction, a well-developed Bandl ring rising high in the abdomen, and thinning of the lower uterine segment, most of us would not attempt version at all, from fear of producing rupture.

Now I want to say that even in these very difficult cases the child may still be turned, and without rupture, by nature's method of thigh pressure. This may be explained by considering that the degree of pressure exerted by the thighs is greater—I think very much greater—than would be exerted by the hand of any prudent obstetrician. And note again, that it is especially greater, the nearer we approach the fulcrum of the femoral lever, the hip-joint, that is to say, low down, near the side of the pelvic brim, on that part of the

uterus—its thinned lower segment—below the contraction ring.

Note again that the thigh pressure is diffused over a much larger surface than could possibly be covered by the hand of the obstetrician. Once more it must be observed that the contact of the thigh with the abdomen, as the act of squatting —or kneeling—begins, progresses, and completes itself, is preëminently a gliding contact, or more exactly a combined movement of "gliding and pressure," which experience has fully demonstrated to be the most effective kind of pressure in operating with the hand by abdominal palpation. This gliding contact of the thigh with the abdomen seems well provided for by the almost "marble polish" smoothness on the inner surface of the cushioned femoral column. In fact, so admirably do the conditions illustrate the natural adaptation of means to ends, that we are almost driven to realize the conception of Pope in the *Essay on Man* that "Nature is but Art unknown to us," and the "apparent discord" even of a shoulder presentation, when considered in relation to thigh pressure, is "harmony not understood."

When the head rests on the *left* iliac fossa, as shown in Fig. 4, then the *left* foot should be poised on its toes, and in rear of the other foot, to bring the *left* thigh in contact with the head, as shown in Fig. 5; the lines of force on the two ends of the fetal ovoid being indicated by the arrows in Fig. 4.

In the more rare dorsoposterior cases of shoulder presentation, the same rule as to the disposition of the two thighs in the squatting process would seem to be proper.

The other method of operating, namely, by manipulating the woman's lower limbs, is designed as an imitation of the thigh pressure produced by squatting, in women unable to rise and squat. The patient being upon her back, the hand of the obstetrician, one on either side, can grasp the front of each knee, and then regulate the degree and direction of pressure at will, by varying the thigh abduction, taking care, however,

that the thighs shall be held in position long enough to ensure the auxiliary rectifying influence of a few labor pains.

In case of impacted shoulder presentation—arrested spontaneous evolution—in which the uterus and its contents have assumed a more or less globular and symmetrical shape —so-called "balling" of the fetus—it would seem that the thigh pressure, produced by symmetrical kneeling, might be more effective than that by squatting. With a thigh column on either side and a third column—that of the lumbar spine—behind, the impacted mass would be grasped, simultaneously, by three columns converging below, diverging above, like the legs of an inverted tripod, and would tend to escape in the direction of least resistance, namely, upward, out of the pelvic brim, thus relieving the impaction. To bring the action of the third column, that of the lumbar spine, into full play, the woman should lean forward as much as possible while kneeling. The lifting power of the thigh columns upon the abdominal contents by symmetrical kneeling is seen in Fig. 6.

Kneeling, however, is not necessarily a symmetrical proceeding. Very often a person kneels only with one knee, as shown in Fig. 7. Here the same effect would be produced as by the unsymmetrical squatting shown in Figs. 3 and 5, the left thigh pressing the abdomen low down, over the left inguinal region; the right one pressing higher up, on the right side over the breech end of the fetal ovoid, that is, assuming the child's head to rest on the left iliac fossa (Fig. 7). This, therefore, would be the correct method of kneeling in this particular presentation and position, with a view of securing its rectification, exactly as already described for the squatting posture. Were the head in the opposite iliac fossa, the woman should kneel on the other knee only. The rule for all cases would therefore be: *Let the woman kneel only on that knee corresponding with the side to which the child's head is directed.*

This briefly is the theory. I regret that I have only a few

cases to present, but these are, I hope, sufficiently conclusive to evoke further clinical experiment, which is the chief purpose of this paper.

In one case of my own—a young primipara with shoulder presentation—I stood facing the foot of the bed, and directed the woman to come and kneel there, placing her hands upon my shoulders for support. On doing so she exclaimed with the first pain that the child was "coming out," which I did not believe, but she was right: in two or three more pains the child was born—delivered by the breech. I must confess that at this time, some years ago, I had not sufficiently considered this matter to direct any special method of kneeling as set down in the present paper. I do not know whether she knelt on one foot or both; but the result was a rapid change of presentation and delivery as stated.

Dr. Homer S. Medford, of this city, has kindly reported to me a case of transverse presentation occurring in his practice in January last, in which the woman, a colored primipara, seventeen years old, insisted upon "sitting up in bed, her knees doubled up and body bent forward"—a position which she maintained until the last few minutes of labor, when she was placed upon her back. On first making his diagnosis Dr. Medford left the patient for half an hour in order to get some students for a clinical lesson. When he returned the case had changed to a head presentation and was so delivered. While this woman was neither squatting nor kneeling in the exact manner I have here suggested, her position was one in which the factor of thigh pressure was decidedly in evidence.

Dr. Eugene E. Barnum reports (*Buffalo Medical and Surgical Journal*, February, 1892, pp. 385-389) the case of a IV-para in which the arm protruded into the vagina. When seen by him the woman had been in labor twenty-eight hours; ergot had been given by a midwife; the waters had been discharged some hours before; the uterus was tetanically con-

tracted upon its contents. Note these extremely unfavorable conditions. All efforts to replace the arm and change the presentation, including the knee-chest position, failed. The doctor gives his reasons why neither embryotomy nor Cesarean section were practicable. The woman was now placed in a kneeling posture at the edge of the bed, and her head and body bent forward as far as possible. Within five minutes in this posture the arm began to recede, and in fifteen or twenty minutes the birth was complete—delivered by the head—and the child born alive, although for several weeks it could not move the prolapsed arm as freely as its fellow. With the conditions present in cases like this, most of us, I think, would resort either to embryotomy or abdominal section, as indeed Dr. Barnum states he would have done had the necessary instruments, etc., been available; yet the child was delivered, both it and the mother surviving, by the pressure of the thighs induced by a kneeling posture changing the arm presentation into a vertex one. Spontaneous version has usually been ascribed to an unsymmetrical or unilateral contraction of the uterus, but this I think is far less susceptible of demonstration than the thigh-pressure view here presented.

I have examined the recent literature of spontaneous version, with a view to learn whether the change of presentation could be ascribed to change of posture, and while in a few cases the change did take place, accompanied by the recognition of a great and sudden movement within, while the woman was seated upon a commode, most of the cases present no such history. This, however, may be explained by the fact that in many instances, where the version has occurred in the absence of the physician, while the woman was squatting over a commode, the circumstance may have escaped mention by the woman as a matter of delicacy, or having been made known to the obstetrician, may have been considered of negative import, and, therefore, not given any recognition in his clinical report.

In December last I addressed a circular note to several Fellows of this Society having charge of maternity hospitals, requesting them to try my new method should they have opportunity for doing so. As yet I have received no reports of cases, but hope there may be some forthcoming during the discussion.

If not, I still trust the matter has been presented in a sufficiently logical manner to invite future clinical experiment, which is the main object in presenting the subject to your consideration.

DISCUSSION.

Dr. James Clifton Edgar.—I had hoped to have some cases of this new method of postural version to report. The first part of the year I received a communication from Dr. King and became extremely interested in the matter. In the two hospital services with which I am connected I handed over this communication to my house officers, with the hope that we would be able to have some cases to report at this meeting, but unfortunately I have had no successful cases, although I am still quite as much interested in the method as heretofore, and I hope to continue with the investigation of this postural version.

One difficulty I have met with is the fact that it is hard to control the internes in the services with which I am connected; that is, if we give them such a scheme as this, and a shoulder presentation occurs in the night, they will give the method a half-hearted trial, and then have some excuse for the necessity of changing a shoulder into a head presentation in as short a time as possible, and proceed to do internal version.

Another difficulty I have encountered is the fact that all of my cases are practically emergency cases that have been attended by midwives. They have been attended by midwives in the tenement-house district, and perhaps seen by outside physicians, and then sent to the hospital as a last resort, with impacted shoulders or with impacted head. Three weeks ago we had such a case

in our hospital service, and I thought I would be able to report the case at this meeting as an illustration of the method set forth in Dr. King's paper. It is hardly fair to report it as a failure of this method, because the woman was in such a condition that she could not be induced or made to take the proper posture. She was mentally in such a state after two days' labor, after having been attended by midwives and physicians, that she could not be induced to assume the proper posture, and an attempt at version, with the postural treatment, as described by Dr. King, was practically out of the question. I must say, however, that it was tried in a rather half-hearted way by an interne, and after putting the woman in the dorsal position and trying the method described by Dr. King, he was unsuccessful. Of course, it is not fair to report this case as a failure of the method. The case was subsequently passed over to another service and Cesarean section was performed. The patient is convalescing at present.

Dr. King has rightly said that external manual version is extremely unsatisfactory, and if we have something in postural version that will be of more utility than external manual version, or than we have had heretofore attempted by manual methods through the abdominal wall, certainly it is a long step forward.

Dr. Robert A. Murray.—While I have been interested in Dr. King's paper, I have not had an opportunity to see a case of transverse presentation since I have been aware of this method. I have always looked upon a transverse presentation as a faulty presentation which depended to a certain extent upon the conformation of the pelvis, and not so much upon the position of the uterus itself. I think it would be well, when the doctor revises his paper, to make this revision, that the pelvis should be carefully examined, so that we do not have a contracted pelvis to deal with, or an irregular form of pelvis from fixation of the sacro-iliac synchondrosis and straight linea pectinea, which I have observed is a cause of transverse presentation.

Referring back, I can explain two cases which I think were due to the postural treatment carried out by the patients. They were both II-paras. In one case the first labor was a difficult instrumental delivery. Three noted accoucheurs in New York

were called in, attempted delivery, and lost the child. In the second labor I was called to see her, and found a transverse presentation, with the left shoulder presenting back to the front. She told me that she did not wish me to stay in the room; that I could go and get my instruments and prepare for the operation which she knew she had to undergo. I got my instruments from my office, visited some other patients in the mean time, thinking the os would be dilated on my return, and that I might interfere, especially as she probably would be in a better frame of mind to undergo interference. When I came back she informed me that she had to go into another room to pass water. I examined her before this, and found a transverse presentation. She used a commode, squatted in doing so, and called me because she had a severe pain while she was in the act of micturition; I ran into the room, found she had a severe pain going on, and after that she said the child was coming. I introduced my hand under her clothes, caught the child, and delivered her. There was no contraction of the pelvis, and doubtless the difficult labor was due to a false position of the fetus corrected by the squatting position while urinating. This woman had a difficult labor the first time.

Another patient Dr. Grandin saw in two deliveries, first and third. During the second labor I saw her with a transverse presentation. I did not attempt to turn the child. The woman was an Italian, very strong and muscular. After examining her, I told her I thought it would be wise for her to urinate and defecate, if possible, which she did, in the squatting position, in the bath-room. When she came back she had a cephalic presentation; the head was descending in the L. O. A. position; the bag of waters had ruptured, and she was delivered in fifteen minutes.

Pressure was exerted in this case during the squatting position, or, owing to the contraction of the uterus during defecation, the child was aided in its expulsion. In both of these cases we have illustrations of the method that Dr. King has so well described. I think also in assuming the squatting position the bending forward brings the axis of the uterus more nearly in line with the axis of the pelvis, instead of bringing the axis

of the uterus in a transverse presentation from one side to the other. I shall try this method. I do not see how the uterus, lying, as it does, with the patient in the recumbent posture, could get so satisfactory an effect as if we had the patient rise and let the uterus press on the superior strait. I think the squatting position is better than the recumbent.

Dr. Egbert H. Grandin.—I want to congratulate Dr. King on his paper, because he has given us something rare nowadays, and this is a novel suggestion. I have no doubt but what theoretically the method is a most excellent one, and also mechanically. But whether it is a feasible one remains to be seen by further experience. It is the exception in New York to see a woman of the better class deliver herself. It is difficult to get such a woman to walk around in the first stage, and when the second stage arrives she wants to take the recumbent posture. We cannot get these women to squat or kneel. Under the conditions represented in illustration Fig. 2, unless the woman is exceptionally fat, with shoulder movable above the brim, membranes unruptured, abdominal or bipolar version, followed by posture in bed, would be the method I would select. In that wonderful case—and it is a wonderful case—where the doctor had an impacted shoulder, membranes ruptured, the uterus contracted and the arm prolapsed, and the squatting posture was of value, there must have been either an exceptionally large pelvis or a small child. In conditions of that type, when I saw more obstetrics than I do nowadays, internal version being contra-indicated, the only thing I could do was to decapitate. As a rule, fortunately, in such cases, the child is dead.

Dr. King.—I wish to express my great gratification for the interest the gentlemen have taken in this subject. I was particularly interested in the remarks of both Dr. Murray and Dr. Grandin. In the case Dr. Grandin mentioned in which the arm presented, I should think the postural method would have been applicable. The case Dr. Grandin refered to as having occurred in the hospital would not come under this category. I sincerely hope that the members will try this method of postural version.

THE SUPERIORITY OF PRIMARY OVER SECONDARY CESAREAN SECTIONS, AND THE FEASIBILITY AND ADVANTAGES OF A PREDETERMINATION OF THE METHOD OF DELIVERY.

By Edward Reynolds, M.D.,
Boston.

When the forceps were first invented it was regarded as an instrument of last resource and even the simplest forceps operations were considered exceedingly dangerous. Its use has been gradually extended until it is today employed to forestall exhaustion, and in its lesser applications, at least, for the mere lessening of suffering. We are living through a somewhat different, but in some respects similar, development of the Cesarean section. Its ancient use was for the preservation of the child after the death of the mother. Its revival after the introduction of asepsis was with the idea of lessening the fetal death rate with but little added risk to the mother. It has come to be regarded as furnishing in certain difficult cases the safest method of delivery for both mother and child. An inquiry into the circumstances under which it is least dangerous seems appropriate to the spirit of the times.

Each man must be guided in the end by the results of his own experience and the experience of those whom he personally knows and trusts. That in my own experience I have escaped without mortality is, I think, due to the fact that the majority of my operations were done before labor,

and that only three could by any stretch of classification be considered late; but I was early struck by the, to me, undoubted fact that both the discomforts which my patients went through during convalescence, and my own anxieties therefrom, were closely proportional to the length of labor which they had endured before operation. My series (29[1] cases without mortality) is, however, too short to carry conviction upon this point to others by a mere recital of the cases. The statistical method of inquiry into the results of others whose personalities are not directly known to us, and of whose cases we have not had personal cognizance, is capable of great abuse and is often misleading, yet it cannot be entirely discarded. It is misleading when conducted upon a series so small that the element of chance is not eliminated, and when used to elucidate points of such delicacy as to lie within the very wide limits of error with which it is necessarily afflicted. It is moderately trustworthy when based upon large numbers of cases, confined to broad lines of inquiry, and attested by sweeping differences in results.

The value of any statistical inquiry must, however, rest so entirely upon the spirit and methods under which it was conducted that it is proper that any statistical argument should be prefaced by a statement of the method employed in preparing it. The table which I propose as a prelude to my own observations upon this subject was prepared after the following method: A library assistant, who was uninformed of the points involved, was requested to collect from the literature of the world all the papers which contained case reports of Saenger Cesarean sections done within the last ten years by operators who had had at least five cases. These original reports were then submitted to me. From them were eliminated all cases in which the section had been performed for placenta previa, eclampsia, carcinoma, or other new-growths; also all cases complicated by other operations having

[1] Now thirty cases.

a mortality of their own, such cases being plainly inapplicable to an inquiry into the mortality of the Cesarean section when used for mechanical obstruction, and as an alternative to the intrapelvic operations. Cases involving operations upon the tubes or ovaries for the prevention of subsequent fertility were not excluded, these being regarded as at times an intrinsic part of the performance of the Cesarean section.

The cases so selected were then divided for the purpose of this inquiry into three classes: (1) Primary sections: Those performed before the beginning of labor, or with the advent of the first pains. (2) Secondary sections: Those performed after a certain amount of labor had demonstrated its probably unsatisfactory character, but before exhaustion had set in, and before it had become definitely established that the natural powers would fail to effect the passage of the brim. (3) Late sections: Those performed after definite arrest of the head at the brim.

It is at once evident that while the line between primary and secondary sections, so defined, is a perfectly clear one, that between the secondary and late incisions is, under the definition, indefinite, and especially so in cases reported in the abstract by others. In separating the cases into their respective classes, I therefore assigned to the secondary section only those cases in which it was definitely stated that the operation was done during the first stage of labor, or that the os was of less size than a fifty-cent piece, putting into the class of late sections all doubtful cases, all cases in which the os was more widely dilated, all cases in which labor had endured for twenty-four hours, or in which it was stated that strong pains had been present for more than eight. Thus many comparatively favorable cases were without doubt unfairly assigned to the unfavorable late class, by which the mortality of this class of late sections is undoubtedly represented as less than it infact should be, and also the secondary sections are restricted to include only the most favorable of

all the operations done during labor; but I hope that you will feel that the final argument is strengthened by this discrimination against the results which my personal experience had led me to expect. I was further careful to assign every case to its final position before ascertaining its result for mother or child.

There were left for analysis 289 cases by twenty different operators. Of these 82 were operated upon before labor began, 158 early in labor, and 49 after the failure of the natural powers was established. The 82 cases done before labor yielded 1 death, a mortality of 1.2 per cent. The 158 cases done early in labor showed 6 deaths, a mortality of 3.8 per cent. The 49 cases done after the arrest of the head, or after an unduly long first stage, showed 6 deaths, a mortality of 12 per cent.

Considered in the most superficial way this very marked variation in mortalities is just what should have been expected a priori, *i. e.*, it shows that when the section is performed for purely mechanical indications, its mortality is proportionate to the amount of labor which has been endured before operation. The Cesarean section before or during labor seems not inaptly comparable to an operation for appendicitis in the interval or during the attack. It is perhaps more strictly comparable to the performance of a simple abdominal operation upon individuals selected at different points during the progress of a Marathon run or previous to the start. Would anyone doubt that if a number of candidates for a Marathon run were divided into classes and subjected to a simple abdominal operation, say the removal of a normal appendix, some before the start, some after the finish, and some at differing periods of the race, that the mortality would be higher among those who were operated upon in an exhausted condition at the finish than among those who underwent the same performance before making the start? The mortality in this case, as in sections during

labor, would probably be roughly proportionate to the amount of exhaustion which the individuals had undergone. But it is not safe to reason from analogy nor upon a priori grounds. It is better to adhere to facts, and an inquiry into the causes of death in these 289 women subjected to the Cesarean section at different periods of labor is exceedingly interesting.

The only death among the 82 primary operations was due to an accidental failure of technique in combination with the incompetence of an assistant. This death occurred in a case operated upon nearly ten years ago, in which the uterus was sutured with catgut, which has since been generally admitted to be an improper material for use in the uterine suture of the Cesarean section, on account of its liability to become untied during the alternate relaxations and contractions of the uterus. The patient collapsed a few hours after labor, at a time when the operator was at a distance in attendance upon another case; an assistant saw her, and pronounced it a mere nervous faintness, needing no treatment. She died shortly afterward, and at the autopsy the uterine sutures were found untied and the abdomen full of blood. The operator himself calls it an unnecessary death, due to a mistake in technique and the incompetence of an assistant. This death would hardly occur today, but for the sake of fairness must be left to stand as the only mortality among this long list of primary cases. It is to be noted that there was no case of peritonitis. This mortality is not only in quantity but in etiology, also in strong contrast to that of the cases operated on during labor.

Although the 158 secondary cases (those done early in labor) were operated on by the same operators and under the same conditions, their mortality was wholly due to infection; all 6 fatal cases died of peritonitis; and among the 49 late cases, under the same conditions, 3 of the 6 deaths were reported as due to peritonitis, 2 were reported under the

word "infection," and 1 as due to thrombosis and embolism during convalescence. Only 1 of these fatal cases had been examined before it came under the care of the operator. In the others the occurrence of infection may be explained variously, *i. e.*, as due to contamination during labor (although in many of them the membranes were unruptured), as due to a lowered resistance from exhaustion, or as the result of a peculiar susceptibility of the peritoneum after long labor.

I do not think that in the present condition of our knowledge we can discuss this question with any degree of scientific certainty, or from any standpoint other than the beliefs of the individual disputant. The fact remains that the only death in the cases operated upon before labor was from an accidental and preventable cause; that the cases operated upon during labor by the same operators showed a mortality which was due throughout to infection and which rose steadily in percentage in proportion to the length of labor endured before operation.

Are the following three conclusions unfair, even when we remember all the uncertainties of the statistical method?

1. It is clear that the mortality of the primary section is less than that of the section performed during labor.

2. It seems also clear that the section performed early in labor is safer than that undertaken after the failure of the natural powers.

It is desirable that cases which are to be subjected to the Cesarean section should be selected as such in advance of labor, whenever the conditions make this possible.

3. It is a severe arraignment of the obstetrics of the last few years that it has so generally failed to appreciate the desirability of making the decision for or against the Cesarean section in advance of labor, and that its literature shows an absence of any sustained effort to make this decision generally possible. Progress has been made, cases with clear indications are now generally operated on in advance of labor, and the

doubtful class which is still commonly submitted to the so-called test in labor is becoming smaller, but it is to be hoped that this unsatisfactory and always dangerous test will in the end be entirely superseded and laid aside. This would be accomplished at once if the profession believed that it is possible to predict the result of labor in advance with sufficient accuracy to warrant action. Some few obstetricians are already convinced that the amount which can be accomplished in this direction is much greater than has been generally supposed, and that our power in this direction is already sufficiently great to be of practical use in certain classes of cases. Success in predicting the result of natural labor to be expected in a given case is dependent upon a capacity for estimating in advance each of the three great mechanical factors in labor, *i. e.*, the obstacle offered by the pelvis, the amount of the maternal muscular powers, and the characteristics of the head. Each of these must be estimated separately, however, and the result obtained by a comprehensive judgment based upon all three.

The amount of the pelvic obstacle is too often spoken of as though it were a mere matter of size obtainable by measurement; in reality the amount of the pelvic obstacle is much more a question of its shape, or rather of the influence of its shape, upon the diminution of its size. Some abnormal variations in the shape of the pelvis offer rather less mechanical obstacles than are afforded by normally shaped pelves of the same size or conjugate; other variations create obstacles much greater than those of a normal pelvis of the same size. We are, in fact, too apt to speak of the "contracted pelvis," as though it were merely diminished in its diameters, when we should speak of the "deformed pelvis," which alters the mechanism of labor, and so makes any diminution of its diameters a matter of greater importance. It is necessarily beyond the scope of this paper to enter into any extended discussion of the subject of deformities of the pelvis, but

the main points which I wish to make: that the estimation of the amount of obstacle to be expected from a given pelvis is quite as dependent upon a knowledge of its shape as upon its mere size, and of the extent to which a diagnosis of its shape depends upon an extended examination of the patient rather than upon mere measurements, may be illustrated sufficiently well by using two of the more common forms of difficult pelvis as examples.

Among the most common of all the difficult pelves is that known as the cylindrical or justominor type. From a mechanical point of view the leading characteristic of this pelvis is that it is long in proportion to its size and that it is rather straight and longitudinally erect, *i. e.*, the inclination of the brim to the horizon is usually less than normal, the symphysis is erect, and the sacrum is straight and erect.

The longitudinal curve of the sacrum is less than normal, the promontory is high and the ilia are also very erect, the false pelvis flaring less than normal. The transverse lines of the pelvis are highly curved. The inlet is very round and the iliac crests are highly curved, the difference in length between the interspinal and intercristal diameters being marked. A line connecting the anterior-superior spines is higher above the pubes than in the normal pelvis.

With these peculiarities is corollated of mechanical necessity a lessening of the anteroposterior curves of the whole spine. The lumbar region is flat, and the relations between the acetabula and the promontory are such that the body weight is borne along a line which forms a loss angle with the upper part of the pelvic axis than in the normal pelvis. The hips of such a woman are usually high and, unless disguised by fat on the outer aspect of the pelvis and thighs, are apt to have a narrow appearance. The legs are straight, and both pelvis and skeleton, as a whole, are more truly neutral or infantile than either feminine or masculine in type. Although no positive rule exists, such women are apt to begin

menstruation late, and to have small uteri with long pointed cervices. The high degree of obstacle afforded by this pelvis in proportion to its size is due to the fact that the obstacle continues throughout almost the whole of the bony canal, the relative shallowness of the longitudinal curves making the middle portion of the pelvis but little more roomy than the superior and inferior straits. If the Cesarean section has been ruled out this form of pelvis is better adapted to forceps or craniotomy than to any other operation. Version is but seldom successful in justominor pelves after forceps have failed, and in this form of pelvis pubiotomy and symphyseotomy are especially apt to be followed by extensive lacerations of the soft parts, owing to the fact that the head meets with resistance throughout almost the whole length of the pelvis.

A hint as to the existence of this pelvis is afforded by the history of sexual development and by the evidences of it observable in the body as a whole. These are, however, not infallible guides. If an examination of the figure standing, and with corsets removed, demonstrates the presence of a straight spine and sacrum, with an ill-marked intergluteal fold and comparatively horizontal, sharply curved iliac crests, with the anterior spines high above the symphysis, all this is strongly corroborative evidence. If this is confirmed by the relation between the interspinal and intercristal diameters as obtained by measurement, and by the shallowness of the longitudinal, and exaggeration of the horizontal curves, as obtained by internal palpation of the sacrum and lateral walls of the pelvis by the fingers within the vagina, the diagnosis of this form of pelvis may be considered established. We have, then, to estimate from the results of all these examinations the degree of its alteration in the direction of this deformity, in order to estimate the amount of difficulty which is to be expected in labor from its size, as estimated from the length of the conjugate taken by measurement.

Another much neglected but very common and highly important pelvis, which has, so far as I know, received no generally accepted distinctive name, is that of which the leading mechanical characteristic is its excessively curved axis. This pelvis is in many respects the opposite of the justominor pelvis. The inclination of its brim to the horizon is excessive, the direction of the symphysis approaches the horizontal, the sacrum is very highly curved and the excavation is roomy, the false pelvis is broad with a wide transverse flare, the acetabula are almost directly under the body weight or may be behind it, and the line of pressure of the body weight is consequently almost directly across the axis of the inlet.

The inlet is of normal shape, but flat rather than round. The whole spine is of mechanical necessity, marked by very highly developed curves, the lumbar curve and the longitudinal curve of the sacrum being especially marked. The hips are wide in appearance, the legs are knock-kneed and often somewhat bandy-legged. The figure, as a whole, is markedly, if not excessively, of the feminine type, and these women usually have an active sexual life.

This pelvis tends intrinsically to be roomy and is then not of operative importance, but the great inclination of its brim makes a difficulty in labor even with normal diameters, and a very serious obstacle whenever its size is even slightly diminished. The head, of necessity, enters the highly inclined brim in a posterior position and the direction of the expulsive forces drives it against the outer side of its curved course, that is, much of the force of labor is wasted in driving the head against the symphysis. When a pelvis of this shape is small in comparison with the head, natural labor usually fails and the intrapelvic methods of artificial extraction have an exceedingly high fetal mortality. The use of forceps high is made difficult, and frequently ineffective, by the posterior position and the excessively backward traction which is necessary to extraction, and though version is a highly effec-

tive operation, it is apt to result in stillbirth from the excessive strains upon the body and the neck as the child is drawn around the nearly horizontal symphysis and through the highly curved pelvis.

In this pelvis the field for the intrapelvic operations is an exceedingly narrow one, and it should be, as a rule, subjected either to natural labor or the Cesarean section in accordance with its size. Its recognition in advance of labor and the estimation of its obstacle in connection with the amount of the other factors in labor is, therefore, of special importance.

The probable existence of this pelvis may be suggested by the excessive anteroposterior curves of the woman's figure as she stands clothed, but a determination of the degree of alteration which is present necessitates a study of the spine in a standing posture after the corsets have been removed. The great curvature of the sacrum with the compensating excessive curvature of the lumbar spine, the deep intergluteal fold, and the excessive inclination of the brim are readily appreciated in this position; but the internal palpation of the pelvis also furnishes evidence of the utmost value; the points of special importance in determining the degree of alteration present being the length and direction of the inner wall of the symphysis, the angle between the superior and inferior straits, and the excess of curvature in the lumbosacral region.[1] The obstacle likely to be afforded by the pelvis is then estimated by comparison of these points with the size of the conjugate as determined by measurement.

It is to be remembered in all cases that we have only one generally applicable measurement which gives us any direct information as to the actual size of the true pelvis, *i. e.*,

[1] In marked cases the inlet of the pelvis may look almost directly forward and the upper portion of the posterior sacral region may pursue a nearly horizontal direction.

the conjugate at the brim as calculated from the direct measurement of the diagonal conjugate. The other commonly taken measurements all relate to the false pelvis[1] and are valuable rather as affording diagnostic information of the character of the deformity present than from the hint which they give us as to size.

The all-important and fundamental point is that every alteration in the shape of the pelvis has so all-important a relation to the rest of the skeleton in the ordinary mechanical efforts of locomotion, that there can be no alteration of its shape without corollated peculiarities of the spine, legs, and feet, and in all the varieties of deformed pelvis observation of the degree of these corollated changes furnishes evidence of exceeding importance as to the degree of pelvic alteration.

It follows from all this that we are only in a position to estimate the amount of obstacle offered by the pelvis when we can postulate that we have a pelvis of such a shape, modified in this direction to such a degree, and likely to present an obstacle of large, moderate, or small amount, because with such a degree of alteration of shape it combines a conjugate of such a size. This whole matter of the importance of the type of deformity present, and also the importance of estimating the degree of such alteration present in each case, has but recently begun to attract attention as a matter of practical urgency, and we as yet lack exact methods for its study. We cannot teach it, we cannot put it within the reach of the general profession, until we have established a normal standard, until we have learned the limits of normal variation, and have acquired methods of measuring, exactly, the degree of variation from the normal in each of the corollated peculiarities. For this it is necessary, first, to establish the normal by the measurement of large numbers of normal

[1] Except in the Robert and similar pelves.

women, and, second, to go through the slow process of comparing a generally accepted normal standard with accumulated experience in abnormal cases. This means detailed work by many men,[1] and its completion may take years or even a medical generation; until then scientific exactness is impossible. It is, however, in the meantime, well within the powers of any experienced obstetrician to add greatly to his power of estimating the obstacle offered by a given pelvis, by training himself in observation along these lines. Only after such an estimation of the pelvic obstacle are we in a position to estimate its relation to labor, in connection with the estimated amount of the maternal muscular and nervous power, and the size and degree of ossification of the individual head.

The long-established but, as I believe, incorrect belief that it is safe to defer decision until after the failure of the maternal powers in labor, has prevented any concerted effort to determine the extent to which we can estimate these powers beforehand, except by study of the history of past labors in multiparæ; but of late years a more careful study of the condition of pregnancy has convinced some of us that such predictions can be made with sufficient certainty to enable us to distinguish, at least the more pronounced cases of obstetrical strength or weakness, with practical certainty. Lack of space and the fact that I have in two recently written papers devoted myself more especially to the study of this factor in labor prevents my entering upon this subject at full length here, but some summary of it is necessary to any consideration of the indications for the primary performance of the section.

No new departure in medicine is likely to command confidence unless it accords both with the known theory of the subject and with the results of practical experience. It

[1] An effort to determine the normal standard by extended measurements is now being carried on under my direction.

is, therefore, necessary to examine any such proposition from both sides; when a procedure is found sound in both ways it seldom fails of acceptance. Belief in this possibility of a prediction of the probable character of labor, with success in marked instances at least, rests on the theorem that the strains imposed upon the organism by pregnancy and labor are inherently similar.

The strains of pregnancy have long been studied and are well known. The development of the child, *i. e.*, the addition of its metabolism to that of the mother, and the consequent injection of an increased amount of waste products into her circulation, throughout imposes an increased strain upon her eliminative system. The existence of the fetal circulation and the consequent increased pressure in the maternal vessels put an added load upon the heart throughout pregnancy. The increase of size and weight during the latter part of pregnancy involves an increased labor for the muscular and respiratory systems in the performance of all the ordinary efforts of life. The existence of all these added loads involves an additional expenditure in the nervous system which governs each and all of them. These several increased loads act and react upon each other. Whenever one part of the system fails under the load of pregnancy it increases the strain imposed upon the others, *e. g.*, when the maternal eliminative system fails to dispose of all the products of increased metabolism, the resulting toxemia in itself decreases the efficiency of the muscular system, and through the heart muscle the efficiency of circulation; which latter of itself impairs anew the efficiency of the eliminative organs, and so creates a vicious circle. The enumeration of the many forms in which deficiency of the one system affects the others must be omitted here, but will be apparent to all upon a little thought.

The strains of labor are these: The intense muscular activity of labor throws into the maternal circulation a sudden

and considerable increase in the waste products of metabolism, and, consequently, involves an increased strain upon the activities of the eliminative system. The great increase in pressure in the uterine and general abdominal circulation involved in each contraction, imposes an additional strain upon the heart. The nervous system is called upon to withstand the strains incident both to the maintenance of powerful muscular contractions and to the endurance of physical pain. These added strains, moreover, as before, react each upon the other, *e. g.*, any failure of elimination creates under physiological law a toxemia which decreases the power of muscular endurance and lessens the coördination of nervous control which is essential to effective expulsive efforts, etc.

The strains of pregnancy and labor are thus evidently similar in kind and exerted upon the same organs. The capacity to endure strains so much greater than those of ordinary life is always dependent upon the normal existence within the individual of reserve strength with which to meet the occasional exigencies of life. We must recognize the factor of safety in vital existence as definitely as in bridge building. When an athlete is about to enter upon severe and long-continued muscular efforts his factor of safety is carefully increased by the process known as training, *i. e.*, the organs which are to be exposed to strain are carefully developed by a process of gradual increase of the daily load. Under normal circumstances this is what happens to the organs of the woman during pregnancy. If her margin of safety is such that her heart and her muscular, nervous, and eliminative systems maintain or increase their efficiency under the gradually increasing load of pregnancy, she may usually be depended upon for strong, sthenic labor. If her natural margin of safety is so narrow that these vital activities fail under the load of pregnancy it is, to use the vernacular, "dollars to doughnuts" that they will fail more

markedly during the added but similar strains of labor. These are the women whose labors are lingering, whose uterine contractions are painful but ineffective.[1]

These theoretical arguments appear to me to be sound. Are they supported by the results of observation? To answer this question each of us must appeal to his own experience, and I can only quote my own. I have been interested in this question for more than fifteen years, during the first ten of which I had under observation a mass of clinical material amounting at the end to about 2500 cases a year, and during the last five a consultation practice, which, though of course much smaller, has been prolific in cases of this kind. About five years ago, *i. e.*, after a ten years' interest in this question, I formulated for myself the theorem that the character of labor can be predicted from the character of pregnancy, and submitted it to continued observation. I watched it for five years longer before committing myself to it, but have now become convinced that in well-marked cases it is a safe guide in practice. I know that some other observers have reached somewhat similar conclusions, and believe that as this problem becomes subjected to still wider observation this leading principle is likely to be generally accepted as trustworthy.

After estimating as carefully as possible the nature and degree of the mechanical obstacle offered by the pelvis, and the probable character of labor as predicted by the course of pregnancy, we have left for estimation the third factor in the result of labor, the size and degree of ossification of the head, a factor for the determination of which we have, in primiparæ, no other guide than physical examination during the last few weeks of pregnancy. We have no mechanically exact method of determining the size or degree of ossifi-

[1] These are the women who furnish the greater part of the mortality of labor plus the Cesarean section, *i. e.*, of the secondary and late section.

cation of the head, but by repeated palpation of the child as a whole during the last weeks of pregnancy, aided by combined internal and external palpation of the head, and by forcing it firmly into the inlet of external pressure, I think we can gain an idea of its size and adaptation which, when combined with a full knowledge of the pelvis and probable maternal powers, will enable us to divide even primiparæ clearly into three classes: (*a*) Cases which will undoubtedly be most safely delivered by primary Cesarean section. (*b*) Cases which may be reasonably expected to deliver themselves by natural labor, and in which if natural labor fails the ordinary intrapelvic operations are not likely to present unusual difficulties. (*c*) A large class of cases in which the decision is still doubtful.

In multiparæ this preliminary classification will be of course greatly assisted by the history of previous labors. It is a matter of universal experience that the labors of any individual woman ordinarily bear a close resemblance to each other, though the first labor is usually longer and harder than those which succeed it. If an accurate history of previous labors is obtainable its consideration in connection with close study of the three mechanical factors, as already outlined, will usually make the decision easy. It may certainly be laid down as a safe rule that when an intrapelvic operation necessitated by alteration of the pelvic shape and diameters, has been so difficult as to yield a stillborn child at the hands of an experienced accoucheur, subsequent intrapelvic deliveries in the same woman are sure to be highly dangerous to the child, and are likely to be less favorable to the mother than the primary Cesarean section with its exceedingly low mortality and absence of subsequent morbidity.

For the doubtful class, whether primiparous or multiparous, a further examination is necessary. Either with the first pains of labor or at an appointed date, as the judgment of the attendant may dictate, such women should be

shaved and both the vagina and abdomen prepared as for any surgical operation. They should be etherized and placed upon the table with abundance of light and assistance. The mechanical conditions presented by the pelvis should be reëstimated and the head examined both by bimanual estimation of its size and by pressing it forcibly into the brim with all the advantages offered by anesthesia and the absence of any hesitation about provoking labor. This further examination should narrow the doubtful class to but few cases, and in those few, if the operator wishes, the hand may be passed into the vagina and the fingers passed within the os between the uterus and membranes, thus subjecting the head to a still better bimanual examination of its shape and size, and permitting their use in estimating more exactly the adaptation between the pelvis and head when the latter is pressed strongly into the brim by external pressure from above. Palpation of the head with two fingers actually within the os and at a height which enables them to play freely over the greater part of its surface affords a fairly accurate estimate of its size, and the examination of its adaptation to the pelvis, under ether and under these conditions, gives very much more definite information than can be obtained at any earlier period.[1]

The single objection to this last method of examination lies in the possible risk of infecting the uterus which is inherent in it, but in the hands of a man competent to open the peritoneum through the vagina and under the same conditions of asepsis and assistance under which he would

[1] I have in the past, in some doubtful cases, applied forceps to the sides of the head and so drawn the head lightly into the brim by way of measuring its adaptation; and if tractions are carefully abstained from I believe this to be a justifiable process, but it is easily overdone. I have not found occasion to employ it for some years past, and I now consider the examination with the fingers within the os to be so far sufficient that upon consideration I am doubtful if I shall ever again employ the forceps in this way.

perform a vaginal hysterectomy, this risk seems insignificant, and is justified by the importance of the question at stake.

When, finally, the results of either of these last examinations into the adaptation between the head and pelvis are considered with reference to the obstacle offered by such an adaptation under the mechanism of the degree of deformity present, and in connection with the estimated muscular and vital condition of the patient as derived from her behavior during pregnancy, there should be but few cases left which cannot be relegated either to the ordinary care of labor or to an immediate Cesarean section; but for the cases which are placed under the ordinary care of labor (including the intrapelvic operations), the choice should be considered as final and irrevocable, *i. e.*, after they have been subjected to a full trial of the natural forces in labor, they should be treated by determined high forceps or version rather than subjected to the very considerable mortality of a late Cesarean section.[1]

In the very few doubtful cases which may still be left after the final examinations I believe that the choice should be made in accordance with the patient's vital adaptability to labor. Strong women, well equipped for labor, may always take their chances with the intrapelvic operations even with considerable mechanical obstacles; but it must be remembered that the ill equipment for labor which is shown by failure to withstand the strains of pregnancy is peculiarly an ill equipment for *labor*. Such obstetrically

[1] Failures of selection may occasionally occur in this class and the choice of operation after the ordinary intrapelvic operations have failed should perhaps be considered here, but is hardly within the scope of this article, other than to say that the very great maternal mortality of the section at this time seems to render it too severe an operation to be justified in the interests of the child alone. The choice in such cases would seem to lie between the operations of symphyseotomy, pubiotomy, and perforation.

ill-equipped subjects nevertheless withstand the ordinary surgical operations perfectly well; they do well under the primary Cesarean section, and for them, in case of doubt, the section should be chosen; these women especially should never be subjected to the combination of labor and a peritoneal operation.

It may be objected to most of what I have said in this paper that such practice is beyond the powers of the general practitioner. I would respond, "It is undoubtedly so." This is not work for inexperienced men. It must always belong to those who are really obstetrical experts, and it is for them to bring about the conditions which permit such work.

Under the conditions of practice of but a few years ago the majority of cases of really difficult labor reached the hands of obstetrical experts only after the failure of prolonged labor, and in hospital practice and in some localities in private practice this is still the rule. With such cases we must do the best we can. They are, however, not usually fit subjects for the Cesarean section. All results show that the late section even when followed by a hysterectomy is so fatal an operation as to be justifiable only for the absolute indication, or in those cases in which the mother's condition is so bad that the chances for the child take precedence.

This point is conceded by experts but has been too little appreciated elsewhere. It is our duty to drive it into the comprehension of the general profession. The mortality of the late section is high when derived from the statistics of men who habitually operate early, but occasional operators rarely publish fatal cases, and if we could obtain complete statistics of all the operations done, I am sure that we should be appalled by the mortality of the late section.

A second and even more important practical point is, that we should teach the general practitioner that the time when his duty to his patient should lead him to seek the advice of a specialist is when he first feels anxiety about a preg-

nancy or an impending labor, and not after the prospects of both of his patients have been compromised by exhaustion in labor. In my own home, where the Cesarean section is perhaps looked upon with more favor than in any other locality in America, such consultations are steadily increasing in frequency, and especially among the better class of practitioners, and this should become the universal rule everywhere.

I think, too, that these signs of the times already show the possibility of a great improvement in the status of obstetrical practice in the future. The obstetrician of today is, as a rule, in the unfortunate position of competing with the general practitioner for the care of normal labor. I am far from underestimating the value of the best attendance in even normal cases, but we must not ignore the practical fact that there are now great numbers of men who can furnish a class of attendance on normal labor, and on ordinary operative labor, which is so nearly that of the expert as to satisfy the community. Most such men feel unwilling to decline the obstetrical work which comes up among the families whom they attend for other troubles, and, however conscientious they may be, this fact renders it difficult for them to ask for consultations during pregnancy with specialists who are their competitors for the care of normal labor.

Once we can teach the great mass of the profession that real success in the management of difficult cases is only to be attained by foreseeing their difficulty, and that it is possible for sufficiently unexperienced men to select these difficult cases during pregnancy; once we can teach them that in such cases the ordinary, reckless, and careless habit of trusting to nature, *i. e.*, to blind luck, in labor, and of sending for a specialist only after the mischief is done, merely leads to ill health to the mother and death to the baby; we shall find all the better class of general practitioners willing and glad to consult beforehand men who have special knowledge, and who do not attend normal labor.

If this proves to be the future of obstetrics it cannot be doubted that obstetricians who are not at everyone's beck and call for normal labor, but who find their practice in the management of really difficult cases alone will be in a far more enviable position than that occupied by most obstetrical experts of today.

TABLES OF

THE SUPERIORITY OF PRIMARY OVER

SECONDARY CESAREAN SECTIONS.

No.	Date	Operator.	No. of Conf.	Previous Labor.	Pelvis.	Before Labor	Early in Labor.	Late in Labor.	Result Mother	Result Child	Remarks.
1.	1901	Kerr, J.M.M.	3.	Craniotomies.	Generally Contracted.		End of first stage.		Well.	Well.	
						in. cd. 3¾					
2.	1901	" "	1.		"		do.		Well	Still. (Prob. irregular oper.)	
						cd. 3¼					
3.	1901	" "	2.	Craniotomy.	" Flat.	Yes.			Well.	Well.	
						cd. 2¾					
4.	1901	" "	4.	All still.	" Flat.	Yes.			Well.	Well.	
						cd. 3½					
5.	1901	" "	1.		" Flat.	Yes.			Well.	Died.	
						cd. 3.					
6.	1901	" "	2.		"	Yes.			Well.	Well.	
						cd. 3¼					
7.	1901	" "	1.		"	Yes.			Well.	Well.	
						cd. 3¼					
8.	1901	" "	3.	Craniotomies.	Flat.			Yes.	Well.	Well.	
						cd. 3¾					
9.	1902	" "	1.		" Flat.	Yes.			Well.	Well.	
						cd. 2½					
10.	1902	" "	4.	Induction and 2 Craniotomies.	Flat.		Os partly dilated.		Well.	Well.	
						cd. 3¾					
11.	1902	" "	3.	1 Induction 2nd 2 Craniotomies.	" Flat.		End of first stage.		Died.	Well	Septic Peritonitis.
						cd. 3¾					
12.	1902	" "	1.		" Flat.	Yes.			Died.	Well.	1 qt. of blood in abdomen. Catgut sutures untied. Collapse considered unimportant and untreated.
						cd. 3¼					
13	1903	" "	1.		"						

16.		" "	3.	Case 6.	" 3¼	Yes.			Well.	Well.	2 Cae. (Case 6)
17.	1903	" "	4.	1 Induct. died. 4 still.			Os well dilated.		Well.	Well.	
18.	1903	" "	4.		Flat. cd. 3¾		Os fully dilated.		Well.	Well.	
19.	1903	" "	2.	Caesarian.			Yes.		Well.	Well.	2nd. Cae.
20.	1904	" "	3.	1 Still, 2 Craniotomies.	" Flat. cd. 3⅝		Some hours.		Well.	Well.	
21.	1904	" "	9.	8 Still.	" "	Yes.			Well.	Well.	
22.	1904	" "	3.	Induc. Still. Craniotomy.	" "	Yes.			Well.	Well.	
23.	1904	" "	8.	5 Still. 2 Living.	" cd. 3⅝	Yes.			Well.	Well.	
24.	1904	" "	1.		" " cd. 3¼			Yes.	Well.	Well.	Porro. Exam Outside.
25.	1904	" "	4.	3 Still.	" " cd. 3½		Os well dilated.		Well.	Well.	
26.	1904	" "	1.		" cd. 3⅛	Yes.			Well.	Well.	
27.	1904	" "	1.		" cd. 3¼		Os well dilated.		Well.	Well.	
28.		de Lee, J.B.	2.	Craniotomy.	Kyphoscoliotic. cd. 8½ c.m.		8 hours.		Well.	Well.	
29.		" "	7.	1 Craniotomy.	Osteomalacic cd. 9½ c.m.	Yes.			Well.	Well.	
30.		" "	4.	1 Craniotomy. 1 Caesarian.	Generally Contracted. cd. 10½cm	Yes.			Well.	Well.	
31.	1905	Sinclair, W.J.	2	Still.	Small.	Yes.			Well.	Well.	This operator 6 previous sections
32.	1905	" "	3	2 Craniotomies	Contracted.		Yes.		Well.	Well.	

No.	Date	Operator	No of Conf.	Previous Labor.	Pelvis.	Before Labor.	Early in Labor	Late in Labor.	Result Mother	Result Child	Remarks.
33	1900	Sinclair, W.J	3.	Still and Died. Difficult	Flat rachitic	Yes.			Well.	Well.	
34	1900	" "	7.	3 Craniotomies.	Small.	Yes.			Well.	Well.	
35	1901	Voorhes, Jas. D.	1.		Kyphotic. 9¼ c.m.			3½ days.	Well.	Well.	Cervix dil. ☇ bags at term. 84 hours labor.
36.	1902	" "	6.	Induction and Cran.	8 c.m.		7 hours dilatation ☇ bags.		Died.	Well.	Operation typical & easy. Became septic. Secondary hysterectomy.
37.	1904	" "	2.	Premature.	Flat. 7¾ c.m.	Yes.			Well.	Well.	Septic puerperium
38.	1904	" "	3.	Premature and Cran.	7¾ c.m.		10 hours.		Well.	Well.	
39.	1905	" "	1.		Rigid cervix.			Induced ☇ bags 2 days Forceps.	Well.	Well.	
40.	1897	Boyd, G.M.	2.	Cae. Section.		Yes.			Well.	Well.	2nd. Cae. Section.
41.	1897	" "	2.	Cran.	Oblique.	Yes.			Well.	Well.	
42.	1898	" "	7.	Induc. and Cran.		Yes.			Well.	Well.	
43.	1900	" "	3.	Cae. Section.		Yes.			Well.	Well.	3rd. Cae. Section.
44.	1900	" "	3.	Still and Cran.			14 hours.		Well.	Well.	
45.	1901	" "	4	2 Craniotomies		Yes.			Well.	Well.	

									Forceps.	Well	Well	
47.	1903	. .	4.	3 Still. – Cae.	c.d. 8 c.m.	Yes.				Well	Well	2nd. Cae
48.	1903	. .	multip.	1 Craniotomy.	7½ c.m.	Yes.				Well	Well	
49.	1903	. .	1.		6 c.m.	Yes				Well	Well	
50.	1902	. .	2	Still.	7½ c.m.		12 hours.			Well	Well	
51.	1906	. .	3.	Diffficult.	Occluded cervix.				24 hours	Well	Well	
52.	1898	Cragin, E.B.	1.			Yes.				Well	Well	
53.	1898	. .	1.		7¾ c.m.		Yes.			Well	Well	
54.	1898	. .	1.		Flat. 5 c.m.	Yes.				Well	Well	
55.	1898	. .	1.		7¾ c.m.	Yes				Well	Well	
56.	1899	. .	1.		Kyphotic. 10 c.m.	Yes.				Well	Well	
57.	1901	. .	1.		Rachitic. 7¾ c.m.	Yes.				Well	Well	
58.	1901	. .	1.						14 hours under midwife.	Well	Well	Horseshoe Kidney.
59.	1898	Markoe, J.W.	1.		8½ c.m.		Yes.			Died.	Well.	Peritonitis and Pneumonia.
60	1902	. .	2.		8 c.m.	Yes.				Well	Well	Septic Puerperium.
61	1902	. .	3.	Premature Still.	8½ c.m.	Yes.				Well	Well	" "
62	1904	. .	1		Nagele 9½ c.m.		20 hour 1st. stage.			Well	Well	
63	1904	. .	1.		Male		Induced & bougie			Well	Well	Septic Puerperium.

No	Date	Operator.	No. of Conf.	Previous Labor.	Pelvis.	Before Labor.	Early in Labor.	Late in Labor.	Result Mother	Result Child	Remarks.
64.	1904	Markoe, J.W.	3.	1. Caesarian.	8 c.m.	Yes.			Well.	Died	Atalectatic Premature Hydraminos.
65.	1904	" "	1.		Gen. cont.	Yes.			Well	Well	
66.	1904	" "	11.		Osteomalacic		Yes.		Well.	Died	Atalectatic Premature. Septic Wound.
67.	1904	" "	5.	Diffcult and Still.	9 c.m.			4 days induction. Strong pains	Well.	Well.	Septic Wound and Puerperium.
68.	1905	" "	2.		8 c.m.	Yes.			Well	Well	
69.	1906	" "	1.		7½ c.m.	Yes.			Well.	Well.	
70.	1905	" "	6.		Male. 8¾ c.m.	Yes.			Well	Well	Septic Puerperium.
71.	1905	" "	3.	Inductions.	8½ c.m.	Yes.			Well	Well	
72.	1905	" "	1.		8½ c.m.	Yes.			Well	Still	Atelectatic.
73.	1905	" "	3.		8¾ c.m.	Yes.			Well	Well	
74.	1905	" "	2.	Still.	Atresia.	Yes.			Well	Well	
75.	1900	Davis, Asa B.	1.		Oblique. 9 c.m.		Yes.		Well	Well.	

77.	1901	"	"	1.					midwife.	Died	Died	operation. Lived 22 hours. No hysterectomy.
78.	1903	"	"	1.		Gen. con. 8 c.m.		9 hours.		Well	Well.	
79.	1903	"	"	3.	Still and Died.	Funnel shape.		Yes.		Well	Well.	
80.	1903	"	"	1.		Oblique.		Yes.		Well	Well	
81.	1903	"	"	1.		Kyphoscoliotic.	Yes.			Well	Well	Myomectomy. small fibroid.
82.	1904	"	"	1.		Oblique. 9 c.m.			Operation Dilatation Strong Pains.	Well	Well.	
83.	1901	"	"	2	Caesarian.	Gen. con. 7½ c.m.			Previous Intra-pelvic Operating.	Died.	Well.	Purulent peritonitis. 2nd. Caesarian.
84.	1900	"	"	3	Easy.	8 c.m.		16 hours first stage.		Well	Well	
85.	1903	"	"	2	Caesarian.	See Case 89.		Some hours first stage.		Well	Well	2nd. Caesarian.
86.	1904	"	"	1.		8 c.m.		long 1st. stage.		Well	Well.	
87.	1905	"	"	1.		Funnel shape.			2 days prev. forceps.	Died	Died	Purulent Peritonitis.
88.	1904	"	"	1.		Gen. cont. 7½ c.m.			15 hours forcible labor.	Well	Died	
89.	1905	"	"	4.	Cran. 2 Caes.	Oblique flat.	Yes.			Well	Well	
90.	1905	"	"	1.		8¼ c.m.			7 hours second stage.	Well	Well	
91.	1904	"	"	2.	Caesarian.	8½ c.m.		Yes.		Well	Well	

No.	Date	Operator.	No. of Conf.	Previous Labor.	Pelvis.	Before Labor	Early in Labor.	Late in Labor.	Result Mother	Result Child	Remarks.
92.	1905	Davis, Asa B.	1.		8 c.m.			2nd. stage 20 hours strong labor.	Well	Well	
93.	1906	" " "	1.		10 c.m			37 hours extraction attempted	Well	Well	
94.	1903	Kasper.	2.	Craniotomy.	7½c.m.	Yes.			Well	Well	
95.	1903	"	3.	Craniotomy.	8½c.m.		Yes		Well	Well	
96.	1903	"	1.		6½c.m.	Yes.			Well	Well	
97.	1897	Schauta clinic	1.		7½c.m.			33 hours. rigid uterus.	Well	Well	
98.	1897		1.		7½c.m.		12hrs. 1st. stage.		Well	Well	
99.	1897		1.		7½c.m.		12hrs. 1st. stage.		Well	Well	
100.	1897		2.	Miscarriage.	8 c.m.			3 days.	Well	Well.	
101.	1897		1.		6½c.m.		7hrs. 1st. stage.		Well	Well.	
102.	1897		3.	Craniotomy.	6½c.m.		4hrs. 1st. stage.		Well	Well.	
103.	1897		3.	Still.	8¾c.m.		3hrs. 1st. stage.		Well	Well	

			1.		7 c.m.		3hrs 1st stage			Well	Well
106	1898		3.		8 c.m		24hrs 1st stage.			Well	Well
107	1898		2.	Natural.	Rachitic. 6½ c.m.		7hrs. 1st stage			Well	Well
108	1898		2.	Caesarian.	Gen. cont. 6 c.m.		2hrs. 1st stage.			Well	Well
109	1898		1.		Osteomalacic. 4½ c.m.		6hrs. pains.			Well	Well
110	1898		1.		7½ c.m.		18hrs. 1st stage.			Well	Well
111	1898		5.	Caes Symphysectomy.	8 c.m.		7hrs. pains.			Well	Well
112	1898		2.	Craniotomy.	7½ c.m.		12hrs 1st stage.			Well	Well
113	1898		2		8⅓ c.m.		10hrs. pains.			Well	Well
114	1898		4.	Craniotomy.	7¾ c.m		8hrs. pains.			Well	Well
115	1898		1.		7½ c.m		7½hrs. pains.			Well	Well
116	1898		2.	Still.	Kyphoscoliotic. 6½ c.m.		3hrs. 1st stage.			Well	Well
117	1899		2.	Decapitation.	7⅛ c.m.		14hrs 1st stage.			Well	Well
118	1899		1.		Gen. cont. 6½ c.m.		11hrs. 1st stage.			Well	Well
119	1899		1.		Gen. cont. 6⅓ c.m.			36 hours.		Well	Well
120	1899		3	Caes. Cran.	7½ c.m.		6hrs. 1st stage.			Well	Well
121	1899		1.		8½ c.m.			3 days 1st stage.		Well	Well
122	1899		1.		8½ c.m			24 hours 1st stage.		Well	Well

No	Date	Operator.	No. of Cons.	Previous Labor.	Pelvis.	Before Labor.	Early in Labor.	Late in Labor.	Result Mother	Result Child	Remarks.
123	1899	Schauta Clinic.	1.		7 c.m.		2hrs. 1st stage.		Well	Well	
124	1899		1.		7⅓ c.m.		16hrs. 1st stage.		Well	Well	
125	1899		3.	Craniotomy.	7½ c.m.		8hrs. 1st stage.		Well	Well	
126	1899		5.	Difficult	Osteomalacic			24 hours powerful pains.	Well	Well	Porro.
127	1899		9.		Osteomalacic		12hrs.		Well	Well	
128	1899		1.		7⅕ cm			3days.	Well	Well	
129	1899		3.	Cran. Caes.			3hrs.		Well	Well	
130	1899		1.		6¾ c.m.		8½hrs 1st stage.		Well	Well	
131	1899		1.		7½ c.m.		5½ hours pains.		Well	Well	
132	1900		1.		7⅓ c.m.		4hours, pains.		Well	Well	
133	1900		2.	Caes.	6½ c.m.		15hrs. 1st. stage.		Well	Well	
134	1900		4.	1 Caes.	6½ c.m.		Some hours 1st stage.		Well	Well	
135	1900		3.	Decapitation and Craniotomy.	5½ c.m.			3 day.	Well	Died.	Porro.

		1.	Craniotomy.	7cm.	1st stage.		Well	Well	
138	1901	2.	Craniotomy.	7½cm.	5hrs. 1st stage.		Well	Well	
139	1901	1.		6½cm.	16hrs. 1st stage		Well	Well	
140	1901	2.	Craniotomy.	8cm.	3hrs. 1st stage		Well	Well	
141	1901	1.		5½cm.	2hrs. 1st stage.		Well	Well	
142	1901	1.		7½cm.	14hrs. 1st stage.		Well	Well	
143	1901	7.	2 Craniotomies.	7½cm.	4hrs. 1st stage.		Well	Well	
144	1901	1.		8cm.	12hrs. 1st stage.		Well	Well	
145	1901	3.	Craniotomy.	7cm.	12hrs.		Well	Well	
146	1901	1.		7cm	6hrs. 1st stage.		Well	Well	
147	1901	2.	Still.	8½cm.	7hrs. 1st stage.		Well	Well	
148	1901	2.	Caes.		6hrs.		Well	Well	
149	1901	1.		7½cm	26hrs. 1st stage.		Well	Well	
150	1901	1.		5cm.	5hrs. 1st stage.		Well	Well	
151	1901	1.		7¾cm	10hrs. 1st stage		Well	Well	
152	1901	1.		7½cm	27hrs. 1st stage.		Well	Well	
153	1901	2.	Still.	6¾cm.	25hrs. 1st stage.		Well	Well	
154	1902	1.		Anchylosed Coccyx	6hours.		Well	Well	

No.	Date	Operator.	No. of Cons.	Previous Labor.	Pelvis.	Before Labor	Early in Labor.	Late in Labor.	Result Mother	Result Child	Remarks.
155	1902	Schauta Clinic	3.	Craniotomy.	8½c.m.		24hrs. 1st stage.		Well	Well	
156	1902		2.	Craniotomy.	8½c.m.		6hrs. 1st stage.		Well	Well	
157	1902		2.	Still.	7 c.m.			39 hours 2nd stage.	Well	Well	
158	1902		6.	Craniotomy.	7c.m.		16hrs.		Well	Well	
159	1902		3.	Craniotomy.	7½c.m.			20 hours. Severe labor.	Well	Well	
160	1902		3.	Caes.	8 c.m.		18hrs. 1st stage.		Well	Well.	
161	1902		1.		7 c.m.		11hrs. 1st stage.		Well	Well.	
162	1902		1.		7 c.m.		11hrs. 1st stage.		Well	Well	
163	1902		1.		8 c.m.			37 hours.	Well	Well	
164	1902		1.		7¾c.m.		7hrs. 1st stage.		Well	Well	
165	1902		1.		8 c.m.		8hrs. 1st stage.		Well	Well	
166	1902		1.		7⅞c.m.		7hrs. 1st stage.		Well	Well	
							7hrs. 1st stage.		Well	Died	Trotz wiederbele-

169	1903	3.	Craniotomy.	7 c.m.	12 hrs. 1st stage.		Well	Well	
170	1903	4.	2 Craniotomies.	8 c.m.	23 hrs. 1st stage.		Well	Well	
171	1903	1.		8½ c.m.	15 hrs. 1st stage.		Well	Well	
172	1903	1.		7⅓ c.m.	9 hrs. 1st stage.		Well	Well	
173	1903	1.		7 c.m.	14 hrs. 1st stage.		Well	Well	
174	1903	2.	Miscarriage.	6½ c.m.	8 hrs. 1st stage.		Well	Well	
175	1903	7.		Osteomalacic.	3½ hrs. 1st stage.		Well	Well	
176	1903	1.		Nagele.	16 hrs. 1st stage.		Well	Well	
177	1903	1.		5½ c.m.	18 hrs. 1st stage.		Well	Well	
178	1903	2.	Still.	8 c.m.	7 hrs. 1st stage.		Well	Well	
179	1903	1.		7¾ c.m.	11 hrs. 1st stage.		Well	Well	
180	1903	3.		8 c.m.		30 hours.	Well	Well	
181	1903	1.		5 c.m.	19 hrs. 1st stage.		Well	Well	
182	1903	1.		8 c.m.	34 hrs. 1st stage.		Well	Well	
183	1903	5.	Craniotomy.	8 c.m.	10 hours.		Well	Well	
184	1903	1.		7½ c.m.	12 hrs. 1st stage.		Well	Well	
185	1904	1.		7½ c.m.	16 hours.		Well	Well	
186	1904	1.		7⅓ c.m.	22 hrs. 1st stage.		Well	Well	

No.	Date	Operator.	No. of Conf.	Previous Labor.	Pelvis.	Before Labor	Early in Labor	Late in Labor.	Result Mother	Result Child.	Remarks.
187.	1904	Schauta Clinic	1.		8 c.m.			3 days feeble pains. Membranes unruptured. Os 2 fingers.	Died.	Well	Thrombosis.
188.	1904		4.	Craniotomy.	7½ c.m.		5hrs. 1st. stage.		Well	Well	
189.	1904		7.		Osteomalacic.		12hrs. 1st. stage.		Well	Well	
190.	1904		1.		8 c.m.		11hrs. 1st. stage.		Well	Well	
191.	1904		6.	Craniotomy.	Osteomalacic.		4hrs. 1st. stage.		Well	Well	
192.	1904		1.		8 c.m.		12hrs. 1st. stage.		Well	Well	
193.	1904		2.	Caes.	7¾ c.m.	Yes.			Well	Well	
194.	1904		2.	Caes.	9½ c.m.		6hrs. 1st. stage.		Well	Well	
195.	1904		2.	Craniotomy.	6 c.m.		8hrs. 1st. stage.		Well	Well	
196.	1904		2.	Caes.	Anchylosed Coccyx.		3hrs. 1st. stage.		Well	Well	
197.	1905		1.		7 c.m.		26hrs. 1st. stage.		Well	Well	
198.	1905		1.		8 c.m.		22hrs. 1st. stage.		Well	Well	
199.	1905		3.	Caes.	6½ c.m.		12hrs. 1st. stage.		Well	Well	

202	1897		1.		5½c.m.		8hours.		Well	Well	
203	1897		2.	Caes.	7½c.m.			36hours.	Well	Well	
204	1897		2.	Craniotomy.	6c.m.		3hours.		Died	Well	Peritonitis.
205	1897		3.	Craniotomy.	7c.m.		19hours.		Well	Well	
206	1897		4.	Craniotomy.	7½c.m.			23hours severe labor.	Died	Well	Peritonitis.
207	1897		2.	Caes.	7½c.m.			23hours. rigid uterus.	Well	Well	
208	1897		2.	Craniotomy.	6c.m.		14hrs. 1st stage.		Well	Well	
209	1898	Gache, S. Buenos Ayres.	1.		6c.m.		7hours.		Well	Well	
210	1899				6c.m.	Yes.			Well	Well	
211	1901		1.		7c.m.		5hrs. 1st stage.		Well	Well	
212	1901		3.	Still.	7c.m.	Yes.			Well	Well	
213	1901		1.		7c.m.		7hours.		Well	Well	
214	1898	Küstner, O.	1.		7½c.m.	Yes.			Well	Well	
215	1898		6.	Craniotomy. Symphyseotomy Caesarian.	8 c.m.	Yes.			Well	Well	
216	1898		2	Craniotomy and Symphyseotomy	6¾cm		3½hours.		Died	Well	Peritonitis.

No	Date	Operator.	No. of Conf.	Previous Labor.	Pelvis.	Before Labor	Early in Labor.	Late in Labor.	Result Mother	Result Child	Remarks.
217	1898	Küstner, O.	3.	Craniotomy.	7¾ c.m.		Some hours.		Well	Well	
218	1899		1.		7¾ c.m.	Yes.			Well	Well	
219	1899		4.	Craniotomy.	8¼ c.m.		Strong pains.		Well	Well	
220	1899		8.	Craniotomy.	8¾ c.m.	Yes.			Well	Well	
221	1899		2.	Caes.	7 c.m.		12 hours		Well	Well	
222	1899		4.	Cran. and Caes.	7½ c.m.			long 2nd stage	Died		Infection.
223	1899		12.	Craniotomy Symphyseotomy.	7½ c.m.	Yes.			Well	Well	
224	1897	Heidenhain, L.	8.	Caes.	4 c.m.		Yes.		Well	Well	
225	1899		5.		Osteomalacic	Yes.			Well	Well	
226	1899		1.		8 c.m.	Yes.			Well	Well	
227	1901		1.		8 c.m.			Yes.	Well	Well	
228	1897	Bar, Paul.	3.	Caes.	Osteomalacic	Yes.			Well	Well	
229	1897		2.	Still.		Yes.			Well	Well	
230	1899		3.	Version Induction.		Yes.			Well	Well	
231	1897	Gummert.	3.	Still.	Osteomalacic	Yes.			Well	Well	

234	1898		4.	Craniotomy.	Bony tumor.	Yes.			Well	Well	
235	1898		5.	Craniotomy.	7 c.m.		12 hours.		Well	Well	
236	1899		1.		8 c.m.			3 days.	Well	Well	
237	1899		3.	2 Still.	7 c.m.		end of 1st. stage.		Well	Well	
238	1900		1.		5 c.m.		Yes.		Well	Well	
239	1902	Brindeau.	1.		7½ c.m.	Yes.			Well	Well	
240	1902		1.		7 c.m.	Yes.			Well	Well	
241	1902		2.	Caes.	7½ c.m.	Yes.			Well	Well	
242	1900	Essen-Möller, Elis	1.		5 c.m.		Yes.		Well	Well	
243	1902				7½ c.m	Yes.			Well	Well	
244	1902				8 c.m.			9 hours 2nd stage	Well	Well	
245	1902		3.	Dissicult.				36 hours	Well	Well	
246	1897	Reynolds, E.	4.	2 Still.	9 cm		19 hrs. 1st stage.		Well	Well	
247	1897		3.	2 Still.	8½ c.m.			11 hours. high forceps Failed.	Well	Well	
248	1898		2.	Premature.	8 c m	Yes.			Well	Well	

No.	Date	Operator	No of Conf	Previous Labor.	Pelvis.	Before Labor.	Early in Labor.	Late in Labor.	Result Mother	Result Child	Remarks.
249	1898	Reynolds, E.	2	Difficult.	8½ c.m.		5hrs 1st stage.		Well	Well	
250	1898		2.	Difficult.	8½ c.m.		7hrs. 1st stage.		Well	Well	
251	1898		2.	Difficult.	8 c.m.		3hrs. 1st stage.		Well	Well	
252	1899		1.		7½ c.m.		14½ hours.		Well	Well	
253	1899		5.	Cran. Induction. Induction. Cran.	7½ c.m.		7hrs. 1st stage		Well	Well	
254	1899		2	Craniotomy.	Small.			36 hours.	Well	Well	
255	1899		1.		8 c.m.		18hrs. 1st stage.		Well	Well	
256	1899		1.		8½ c.m.	Yes.			Well	Well	
257	1899		4.	Caes.	8½ c.m.	Yes.			Well	Well	
258	1900		9.	All Operative.	8½ c.m.	Yes.			Well	Well	
259	1900		1.		8½ c.m.	Yes.			Well	Well	
260	1900		3.	Caes.	8½ c.m.	Yes.			Well	Well	
261	1900		1.		Obliques		7hrs. 1st stage.		Well	Well	
262	1900							Some hrs.			

			2.	eclampsia.	7½ c.m.	Yes.			Well	Well	
264	1904		4.	Difficult intra-pelvic operations.	Cicatricial vagina.	Yes.			Well	Well	
265	1904		2.	Difficult version.	Justo-minor.	Yes.			Well	Well	
266	1904		2.	Caes.	Justo-minor 8½ c.m.	Yes.			Well	Well	
267	1905		3.	Forceps still.	Excessive Curvature 8 c.m.	Yes.			Well	Well	
268	1905		1.		Justo-minor 8½ c.m.	Yes.			Well	Well	
269	1906		2.	Caes.	Justo-minor 8½ c.m.	Yes.			Well	Well	
270	1906		2.	Version and Caes.	Justo-minor 7½ c.m.	Yes.			Well	Well	
271	1901	Davis, E.P.	1.				1st. stage.		Well	Well.	
272	1901		2.	Forceps.	Small and malpresentation.		1st. stage.		Well	Well	
273	1902		1.		7 c.m.			2nd. stage.	Well	Well	
274	1902		3	Forceps and Induction.	Small		Yes.		Well	Well	
275	1902		1		Small.		Yes.		Well	Well	
276	1903		1.		Small		Yes.		Well	Well	
277	1903		1		Small			2nd. stage.	Well	Well	

No.	Date	Operator.	No. of Conf.	Previous Labor.	Pelvis.	Before Labor.	Early in Labor.	Late in Labor.	Result Mother	Result Child.	Remarks.
278	1904	Davis, E.P	1.		8 c.m.		Yes		Died	Well	Infection.
279	1904		1.		7½ c.m.		Yes.		Well	Well	
280	1904		1.		8 c.m.		4 to 5 hours.		Well	Well	
281	1905		2	Still	7½ c.m.		Yes.		Well	Well	
282	1905		1.		Small.			2nd stage	Well	Well	
283	1905		3.	Difficult	7½ c.m.			2nd stage.	Well	Well	
284	1905		3.	Craniotomy.	Small.		18 hours.		Well	Well	
285	1905		1.		Small.			40 hours.	Well	Well	
286	1905		1.		Small.		Yes		Well	Well	
287	1906		4.	2 Induced.	Small Oblique.		1st. stage		Well	Well	
288	1906		1.		Small.		1st. stage.		Well	Well	
289	1906		1.		Small		Yes.		Well	Well	

This table must not be interpreted as giving the operators quoted, since it excludes cases previous to the last ten years, and some cases in which the data were insufficient for quotation. It was intended that the table should cover cases of the classical Caesarian section only, but since this has been practically abandoned for late cases, it proved necessary to include the Porros there.

PUBIOTOMY IN AMERICA, WITH THE REPORT OF TWO CASES.

By Henry D. Fry, M.D.,
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Obstetrical practice is rapidly developing along surgical lines. The induction of abortion and premature labor, the immediate repair of lacerations of the soft parts, forceps, version, and embryotomy formerly constituted the sum total of obstetrical operations. The success which followed the adoption of aseptic technique led to the development of abdominal work. The classical Cesarean section was rehabilitated. Porro's operation was added to the resources of obstetrical surgery, and myomectomy during pregnancy became justifiable in selected cases. Symphyseotomy came back to us and for a time claimed enthusiastic supporters. Surgery was resorted to in the treatment of puerperal infections, vaginal incision and drainage, hysterectomy, and the removal of diseased appendages.

The artificial dilatation of the cervix passed from the domain of medicine to that of surgery. The transition was gradual from hot douches, tampons, the application of belladonna, etc., to rubber bags, manual and then instrumental dilatation, and finally to vaginal Cesarean section.

The last operation has engaged our attention during the past few years and at the meeting of this Society held at Niagara, in 1905, it was discussed in connection with the treatment of the toxemia of pregnancy. Since that time it has

been growing in favor in this country, and the number of operators who recognize its value is increasing.

The latest operation to demand our attention is the subject of this communication—pubiotomy. Symphyseotomy did not retain its popularity long. Opposition arose on the grounds that it was bad surgery to open a joint except under aseptic conditions, and the surroundings of a puerperal woman with the risk of infecting the wound with the lochial discharge were not considered such. Complications were met with at the time of, and subsequent to, the operation; convalescence was slow and irksome; and a strong, useful joint was not always secured afterward. Nevertheless, distinct indications existed for its employment as a secondary operation in moderate degrees of pelvic contraction. If the opportunity be presented to perform Cesarean section primarily, the best results are obtained and the practice meets with favor. The danger of high-forceps operation is as great, or greater, to the mother than elective Cesarean section, while it is certain that many more infants will be saved by the latter. I believe advanced obstetrical teaching will take the position that it is obsolete practice to attempt to deliver these cases by high forceps or version when the head fails to mold or engage after a reasonable duration of labor pains. Engagement of the head justifies the tentative application of the forceps, aided by placing the woman in the Walcher position. Unfortunately the obstetrician does not see many of these cases until after prolonged and unsuccessful attempts have been made to extract with high forceps. The perineum has been lacerated, the vulva contused, the woman is exhausted by prolonged labor, and is probably already infected.

The condition favorable to a successful Cesarean section is passed; the infant is still alive; and the obstetrician is opposed to craniotomy under the circumstances. Pubiotomy now comes to supplant symphyseotomy, and the object of this paper is to discuss the questions: Is it free from the objec-

tions raised against symphyseotomy, and are the results obtained sufficiently good to encourage us to employ it in the class of cases indicated? The foreign literature answers both in the affirmative.

I beg leave to report here the following two cases of pubiotomy:

CASE I.—Was seen in consultation with Drs. Luckett and Lewis, Monday night, January 28, 1907. Patient had been in labor eighteen hours. Mrs. W., aged thirty-three years, multipara, had been delivered in her previous labor after a difficult and prolonged high-forceps operation by Dr. Luckett and his father. The infant weighed 8½ pounds and survived, although the head was badly injured. This second confinement was expected December 29, 1906, but she did not begin labor until 3 A.M., January 28, 1907. The large size of the infant, 10½ pounds, and advanced stage of ossification of the bones of the skull indicated a protracted gestation. Labor pains were strong, and the waters escaped at 10 A.M. Dr. Luckett failed to deliver with high forceps and called Dr. Lewis in consultation. The axis traction forceps was employed and active efforts made because the operation had succeeded at the previous confinement. Dr. Lewis is a strong, muscular man, and thinks he must have exerted as much as 200 pounds' force. The patient was sent to the George Washington University Hospital to undergo Cesarean section and Dr. I. S. Stone saw her in consultation. He advised symphyseotomy or pubiotomy. I was then called in consultation. The fetal heart sounds were distinct; os fully dilated; head at the brim, with a large caput succedaneum. The external conjugate measured 17.5 cm.; the conjugata vera 8.5 cm. The catheter was introduced and about 2 ounces of bloody urine escaped. Cesarean section was discarded because of the prolonged efforts that had been made to deliver with high forceps, and because the bloody urine indicated an injury to the bladder. The minor degree of pelvic contrac-

tion, the full dilatation of the os, and the probability that infection had already occurred, favored pubiotomy. The patient was sent to the operating room and prepared. A long ligature carrier, with the curve at right angles to the shank, was introduced through a button-hole incision at the upper margin of the bone and a little to the left of the median line. Guided by the finger in the vagina, the carrier hugged the posterior surface of the bone and came out underneath on the external surface of the labium majus on a level with the clitoris. The Gigli saw was attached to the ligature and drawn through. The bone was rapidly severed about 1 cm. to the left of the joint. Hemorrhage was easily controlled by pressure except at the lower opening, where a catgut suture checked the bleeding and closed the wound. Forceps applied and the infant easily extracted. The ends of the bone separated about 5 cm. This was more than necessary and due to failure of the assistants to support the pelvis laterally during extraction of the head. The undue stretching of the soft parts caused a transverse tear on the left side at the attachment of the anterior vaginal wall. This was sutured with catgut and healed without trouble. There was some hemorrhage from the uterus after delivery of the placenta, but it checked promptly after a hot sterile douche and gauze tamponade.

The patient came out of the anesthetic in good condition and made an excellent recovery. There was some rise of temperature for the first week, maximum 102°, with a disagreeable odor to the lochia. One intra-uterine douche was given after removal of the tamponade on the second day. The blood in the urine disappeared after the delivery. On the tenth day no motion was felt with the finger in the vagina when the patient was turned on her side. The pelvis was fixed with a broad strip of adhesive plaster and an abdominal binder, and sand-bags placed at the sides of the pelvis. She returned to her home at the end of three and one-half weeks and sat up in bed after the fourth week. This woman was very manage-

able and bore the discomforts of her convalescence with great fortitude.

Examined April 12, about ten weeks after the operation. Bony union was good. No callus could be felt on the anterior or posterior surfaces of the bone or at either sacro-iliac articulation. There was a slight notch at the lower border and some tenderness on pressure. She walked without discomfort and had no trouble in going up stairs.

The infant weighed 10½ pounds, the anterior fontanelle was almost closed, and the various diameters of the head measured from 1 to 2 cm. above normal. A few days after birth it developed meningeal symptoms and died on the fifth day. On the fourth day Dr. Lewis trephined the right parietal bone and gave exit to serous fluid without relief. Autopsy revealed two fractures of the occipital bone and a blood clot at the base of the brain.

Case II.—I was called in consultation by Dr. Roman, Sunday morning, March 17, 1907. He had been unable to deliver a primpara with high forceps. When I reached the house the patient had been under ether two hours. She was thirty-six years of age and weighed 190 pounds. The perineum was torn and the vulva badly contused. The surroundings were not conducive to aseptic work. Labor had begun Saturday at 11 A.M. The head was at the brim with a large caput succedaneum; position transverse, occiput to the left. Flat pelvis—conjugata vera 8.5 cm. Tentative application with forceps failed.

The patient was sent to the operating-room of the Garfield Hospital and immediately prepared for operation. The method of operating was changed from that of the previous case on account of the thickness of the superimposed fat. An incision about 3 or 4 cm. long was made on the left of the median line, extending upward from the top of the pubic bone. The finger was pushed down behind the bone and then, with the finger in the vagina, the ligature carrier was guided, as

before, under the bone and to the outside of the labium majus. The bone was speedily severed and the infant delivered easily with forceps. Separation about 4 cm.; very little hemorrhage. The limbs were extended and lateral pressure upon the pelvis brought good apposition. Retractors inserted in the incision exposed to view the ends of the bone. Two chromicized catgut sutures were passed through the periosteum and the wound closed by silkworm-gut sutures. A broad, adhesive strap was applied around the pelvis and the patient put to bed with sand-bags on each side. Owing to the thick layer of subcutaneous fat, the adhesive plaster and muslin bandage failed to keep the ends of the bone approximated. A heavy canvas sursingle, about three inches wide, was buckled tightly with two straps around the pelvis, the upper edge just below the anterior superior spines. This pelvic girdle was padded on each side to relieve pressure and answered the indications admirably. In future I shall employ this instead of the adhesive strap. The patient was annoyed by gaseous distention of the bowels for one week although daily evacuations occurred. Strychnine was administered by mouth, and three times daily she received a hypodermic of eserine salicylate, $\frac{1}{40}$ grain, with nitroglycerin, $\frac{1}{100}$ grain, and sulphate of magnesia by mouth on alternate days. An occasional hypodermic of heroine was given to relieve restlessness. Owing to the heavy weight of the patient it was difficult to place her upon the bedpan; consequently, she often passed feces and urine in the bed. She had 2° or 3° of fever for the first week; then it rose to 102° and phlebitis of the left leg developed. On the tenth day her condition was excellent, and she expressed herself as feeling unusually well. She was turned carefully on the side in order to clean her and change the linen. This was probably a fatal error, as early the next morning soon after having been turned again, symptoms appeared of heart embolism and she died twelve hours afterward.

The infant weighed nine pounds; it made a few ineffectual efforts at respiration. The head was badly bruised and disfigured by the forceps.

In the first case, I cannot help thinking that if labor had been induced about two weeks before the expected confinement (December 29) she would have given birth to a live baby, either without assistance or by an easy forceps delivery. Or, if an elective Cesarean section had been performed at the time of labor, or even if the pubiotomy had been done before such fruitless and vigorous attempts had been employed to deliver with high forceps, the infant could have been saved.

The same criticisms apply to the second case, with the additional thought as to whether Cesarean section, or the Porro operation, might not have saved her life even in the unfavorable condition presented at the time I saw her. It would not have prevented the sepsis and phlebitis, but there would not have been the same indication to turn her on the side, and this was probably the cause of the embolism.

The Fellows of this Society are familiar with the foreign literature of pubiotomy, and my object now is to obtain American experience and views of its value. I have written personal letters to a number of prominent obstetricians asking their opinions, and I take this opportunity to thank them for courteous replies.

The first pubiotomy performed in this country was by Dr. E. B. Montgomery, of Quincy, Illinois. Dr. Montgomery operated December 6, 1903, for persistent mentoposterior position. He attempted a symphysiotomy, but failure to sever the joint led him to use a small metacarpal saw. He says, "My operation, though made in the median line, was evidently an extra-median symphyseotomy." Dr. Whitridge Williams has had the largest experience in pubiotomy, having performed 7 operations at the Johns Hopkins Hospital.

I have collected in all 20 pubiotomies performed in America by eleven operators. They are distributed, geographically, as

follows: Baltimore, 7; New York, 4; Philadelphia, 3; Washington, 2; Brooklyn, 1; Quincy, Illinois, 1; Montreal, 1; and Cleveland, 1.

In favor of the operation, I mention Norris, Grandin, De Lee, Reynolds, Marx, Peterson, E. B. Montgomery, A. H. Bill, and C. S. Bacon.

Norris says: "I have done one pubiotomy, which favorably impressed me with this operation . . . Personally, I believe the operation has a field of usefulness, and I am only waiting to have my enthusiasm lessened by reports of disasters which probably will come sooner or later."

Grandin: "It appeals to me, however, as preferable to symphyseotomy."

Reynolds would always prefer Cesarean section as a primary operation, but he believes "there is a small field for one or the other of these operations (symphyseotomy or pubiotomy)," that is, "in the neglected or septic cases in which forceps fail but are thought likely to succeed after one of these operations."

Marx says: "In the few selected cases pubiotomy is a very valuable measure, easy of performance and reasonably safe. My two cases should *not* be used against the utility of the operation."

Peterson: "Theoretically it strikes me that this operation is far better than symphyseotomy. A good cut through the bone is better than through the symphysis . . . I shall certainly try the operation if I have occasion."

Bacon: "I have not done a pubiotomy, although I have studied the operation on the cadaver rather carefully, and am not quite satisfied as to its superiority to symphyseotomy. The latter operation, as described by M. L. Harris in the *American Journal of Obstetrics*, 1894, is I believe quite as safe as either the subcutaneous or open operations of pubiotomy. The question then remains which has the better convalescence and which leaves the patient in the better condition after

recovery. It is probably too early to reach a decision but the advantage seems to be slightly on the side of pubiotomy. Hence I have decided to adopt the operation in the future."

Not in favor of pubiotomy are Cragin, Davis, Hirst, F. S. Newell, Gustav Zinke, Dorland, Jarman, Lapthorn Smith, Jewett, and Gustav Seeligman.

Cragin says: "Somehow it does not appeal to me."

Davis: "Reports on cases of pubiotomy have not impressed me sufficiently favorably to lead me to adopt it."

Hirst: "I have performed pubiotomy twice this winter, but like it little better, if any, than symphyseotomy, which I gave up seven or eight years ago. In a perfectly favorable case the operation works very well, but there are so many opportunities for embarrassment and complicated convalescence that I think it infinitely inferior to Cesarean section. As in the case of symphyseotomy, it requires numerous assistants to do the operation properly and the care of the patient afterward is most trying."

Seeligman: "It is unsurgical and I feel that as soon as a large number of cases will have been reported, statistics will show a not inconsiderable mortality. Personally, I shall in future hesitate very much before I do pubiotomy and ten times rather do a Cesarean. When I have to deal with an infected case, where others have half-killed the baby, I shall perforate."

Of those not in favor of pubiotomy, three have performed the operation—Hirst, Jewett, and Seeligman—while the others object on theoretical grounds, or are satisfied with symphyseotomy. Zinke disapproves of both operations. Speaking of pubiotomy he says: "The operation has not appealed to me at any time as a proper substitute for symphyseotomy, and I regret to add (although I have performed this operation successfully, saving both mother and child), I cannot speak of it very enthusiastically. It is the only symphyseotomy I have ever performed . . . I obtained perfect union and

the patient has not the least inconvenience from it in walking or in any other way. In fact, she does not know that the joint was ever divided. But the care the case required after operation to secure a good result, I cannot now take the time to describe. All I can say to you is, that I will not perform the operation again because of the enormous care necessary to obtain good union, to say nothing of the many failures that have been reported in the past."

Newell, Edgar, Jewett, Davis, and Jarman think symphyseotomy gives as good results as pubiotomy.

Jewett thinks symphyseotomy is easier to perform than pubiotomy. He says he has performed symphyseotomy "eight times and my associates at the college have together had about as many more. The joint in all cases, I think, became solid and no ill results of any moment remained so far as I know, certainly in none of my own cases." Jarman says: "My cases of symphyseotomy have been so successful that I have seen no reason to modify the operation."

The following operators also report satisfactory results from symphyseotomy: Davis, 8 cases; Edgar, 6; Newell writes: "The end-results in the three symphyseotomies which I saw done, as far as the pelvis went, at least, were perfectly satisfactory, and I do not believe that pubiotomy would have improved them."

Personally, I have performed symphyseotomy four times and all were satisfactory. From my limited experience, however, with the two operations, I would say that pubiotomy is even easier to perform than symphyseotomy. There is less danger of wounding the urethra and bladder; the wounds are removed from the danger of infection from the lochia; hemorrhage at the time of the operation was less and convalescence may be a little shorter, but it is tedious and demands much attention.

SUMMARY.

Twelve of the pubiotomies were primary and 8 secondary. The maternal mortality was four deaths, or 20 per cent. of all the cases. In the primary operations there was no death: the four deaths give a mortality of 50 per cent. for the secondary operations. The fatal results are not directly attributable to the operation, but to prolonged labor and infection caused by fruitless efforts to deliver by high forceps before pubiotomy was resorted to. One mother died of shock on the second day (Seeligman); 1 from sepsis on the fifth day (Marx); 1 from heart embolism on the eleventh day the result of septic phlebitis of the left leg (Fry); and 1 from pulmonary embolism, forty-two days after the operation. This was Hirst's second case and the patient suffered from a bad laceration of the anterior vaginal wall and compound fracture of the symphysis with a discharging sinus. Eight of the infants, 40 per cent., died during the first week. There was one death in the primary cases, 8.5 per cent. This was reported by Williams, and he says: "It is hard to account for the death unless it can be attributed to the exceedingly poor way in which the mother took chloroform." Head injuries by the forceps caused four deaths. Seeligman says in his second case there was a hematoma on the left side of the neck, and an injury to the right frontal bone, which went into the brain substance. The infant in Jewett's case died in convulsions on the seventh day. In my first case, the infant died on the fifth day from meningeal symptoms. Autopsy showed fracture of the occipital bone in two places and a blood clot at the base of the brain. In my second case the infant died immediately after birth, and head and sides of the neck were badly bruised. Montgomery says the infant in his case was delivered alive, but so cyanotic and exhausted that, despite effort at resuscitation, it survived but thirty minutes. The remaining

two deaths were attributed to "prolonged labor (Marx)" and "inspiration pneumonia (Hirst)."

COMPLICATIONS DURING THE OPERATION.

Schmidt broke one Gigli saw. Marx attempted a second pubiotomy and broke three saws; then completed the case by craniotomy. Jewett says it is difficult to prevent this accident, as the saw often sticks. Marx thinks it was his own fault, "for," he says, "instead of sawing straight up and down, I did it in a semicircular fashion." In my own cases, the bones were easily and quickly sawed. The saw should be moved up and down with a steady movement and not in jerks, and it ought to be worked at an obtuse angle of 120 to 150 degrees. In a few cases there was little hemorrhage during the operations, but most of the operators describe it as "sharp," "profuse," or "considerable." It comes from the plexus of veins below the pubic bones and from the crus clitoridis. As a rule, the bleeding was readily controlled by pressure. Seeligman was compelled to apply deep ligatures. In one of my cases there was little bleeding and no effort was necessary to control it; in the other there was a sharp hemorrhage from a superficial vessel which was controlled by one suture that also closed the lower opening. Laceration of the anterior vaginal wall is mentioned in 7 cases (Jewett, Schmitt, Seeligman, Williams, Hirst 2, and Fry). In Jewett's, Seeligman's, and Williams' cases the lacerations opened into the incisions. Seeligman says: "In spite of the utmost care in extracting the head, the bridge of tissue between the vagina and canal made by the Gigli saw gave way, and on inspection I found that the vagina was entirely torn off on the left side and anteriorly." In one of Williams' cases, he reports: "The child was very large and in extraction the anterior vaginal wall tore through, making a large, gaping wound in which

both ends of the pubic bone could be seen, and from this wound hemorrhage was profuse." The child weighed over eight pounds and the separation of the ends of the pubic bone was 6 to 7 cm. In my first case there was a transverse tear of the anterior vaginal wall on the right side. It was due, as Jewett observed in his case, to the inexperience of the assistants allowing the bone to separate too far. All of these cases of lacerations of the anterior vaginal wall were repaired at the time of operation and healed without complication. In one of Hirst's cases there was a submucous tear in the sulci and in the other a very bad laceration of the anterior vaginal wall with an infected compound fracture of the symphysis.

In none of the cases was any difficulty encountered in extracting the child after sawing through the bone. Schmitt's case and both of Seeligman's were allowed to continue in labor from one and one-half to two and one-half hours after separation of the divided bone before application of the forceps. The average distance of separation of the bones was about 4 cm. It varied from 2.5 cm. to 6 or 7 cm. Williams had to extract the placenta manually in 1 case. In one of his cases and one of mine, there was postpartum hemorrhage which required intra-uterine tamponade.

COMPLICATIONS DURING PUERPERIUM.

Fever. There was some rise of temperature in all of the cases, primary as well as secondary operations. The minimum was 99.8° and maximum 102.4°. The duration of febrile elevation varied from a few days to two weeks. *Septic phlebitis* of the lower extremities was reported in 5 patients (Jewett, Marx, Fry, and two of Williams'). It involved the femoral veins of both legs in Jewett's and Marx's cases, and affected the calf of the leg in Williams' and mine. *Hematoma and edema of the vulva* on the left side occurred five times.

There was no reported injury to the bladder or urethra. Schmitt's patient was unable to urinate and had to be catheterized four weeks. She developed cystitis. One of Williams' cases had to be catheterized a few days.

Marked abdominal distention complicated 2 cases (Williams, Fry). In Williams' case the bowels moved poorly; in mine, free evacuations occurred daily.

Good, bony union resulted in all of the cases and no inconvenience in walking was reported except in one of Williams' patients. "She complained of some difficulty in going up and down stairs, having to put her entire weight on the right foot."

Digital examinations could detect no callus on the posterior surface of the bone in any of the cases. In some cases definite callus was felt anteriorly. In one of Williams' cases a furrough 1 cm. deep, on the anterior surface, marked the site of union of the ends of the bone, and in the same case, callus was found at both sacro-iliac joints.

CONCLUSIONS.

Pubiotomy is a satisfactory operation, so far as the operation itself goes, for enlarging the pelvic girdle in moderate degrees of pelvic contraction. It is easy to perform and can be employed in simple flat pelves with a conjugate vera of 7 or 7½ cm. Separation of the severed bone, for 4 or 5 cm., is usually sufficient to enable easy extraction with forceps.

The principal objection to the operation is the difficulties encountered in the after-treatment. They are little, if any, less than those which brought symphyseotomy into disrepute. The pelvis must be immobilized and the patient kept in the dorsal position several weeks. Maternity institutions can overcome the objection to a large degree by the use of a special bed, as the hammock suspension bed described by Ayres.

Williams used the Bradford frame after two of his operations. Jewett employed an ordinary hospital stretcher, "the poles of which were lashed to the top rails of an iron bedstead. A trap-door was provided for the dejecta." Montgomery recommends a pelvic sling suspended from the ceiling and attached to a compound pulley. Ordinarily, after pubiotomy and symphyseotomy, the evacuations of the bladder and bowels are attended with discomfort, and it is a hard task for the nurse to keep the parts clean, which is the more important after secondary operations where the patient is already septic and the soft parts contused and lacerated.

In consequence, therefore, of the unsatisfactory convalescence after pubiotomy, the operation will obtain in this country a limited field of usefulness as an elective operation. Cesarean section offers a substitute free from this objection, and its indications will be extended to embrace these cases of minor degrees of pelvic contraction. With a head movable above the inlet, and one which will not descend by suprapubic pressure, that operation should be performed primarily. When the head is moulded and engaged, forceps may be tried tentatively before resorting to sections.

The indications for pubiotomy may be stated then, a living child and some contra-indication to Cesarean section. The usual conditions presented are: A moderate degree of pelvic contraction, which has been unrecognized generally, ineffectual efforts employed to deliver with high forceps, the woman exhausted and infection probably started.

If the child be dead, craniotomy; if alive, pubiotomy—pubiotomy, in spite of the objections against it. It is better to have a live woman at the end of a tedious convalescence than a dead one after a "successful" operation.

Pubiotomies Performed in America.

Name.	Case.	Para.	Primary or secondary.	Previous labors.	Duration of labor and treatment.	Indications.	Result to mother.		Cause of death.	Result to infant.		Cause of death.	Weight of infant.	Reported.
							R.	D.		L.	D.			
Montgomery, E. B.	1	I	S.	.....	17 hours ineffectual efforts to correct malpresentation and forceps.	Impacted mento-post.	1	...	.....	...	1	Cyanosis.	?	1
Seeligman, Gustav	1	I	P.	.....	51 hours.	Conj. V. 9.5 cm.	1	...	.....	?	...	.....	6¼ pounds.	2
Seeligman, Gustav	2	?	S.	.....	2 days and nights. Attempts high-forceps.	Conj. V. 8.5 cm.	...	1	Shock 2d day.	...	1	Head injury.	9 pounds 3 ounces.	2
Jewett.	1	III	S.	1. Stillbirth. Forceps. 2. Version. Baby died.	42 hours. Forceps tried.	Forceps and Walcher position failed.	1	...	.....	...	1	7th day. Head injury.	10 pounds 5½ ounces.	3
Sennitt, T. A.	1	I	P.	.....	40 hours.	Conj. V. 8 cm.	1	...	.....	1	...	.....	?	4
Evans, D. T.	1	III	P.	2. Craniotomies.	?	Conj. V. 8.5 cm.	1	...	.....	1	...	.....	?	5
Marx, Simon	1	I	S.	.....	Very prolonged and various attempts with forceps.	Flat, rachitic. 7½ cm. plus.	...	1	Sepsis 5th day.	...	1	Prolonged labor.	8 pounds +.	2
Norris.	1	III	P.	1. High forceps. 2. Dead infant. Craniotomy.	6 hrs. Strong pains. Cervix dilated.	Contracted pelvis. Conj. V. 8 cm.	1	...	.....	1	...	.....	7 pounds 14 ounces.	6
Hirst.	1	IV	P.	1. Forceps. 2. Forceps. 3. Craniotomy.	Performed primarily at 8th month.	Character previous labors. Contracted pelvis. Conj. V. 8 cm.	1	...	.....	1	...	.....	6 pounds ½ ounce.	2
Hirst	2	III	S.	1. Axis traction. Others difficult.	4 days in labor without engagement of head.	Prolonged labor. Contracted pelvis. Overgrown child. Failure axis trac.	...	1	Pulmonary embolism. 42d day.	...	1	Inspiration pneumonia.	9 pounds 11 ounces.	2
Fry.	1	II	S.	Difficult forceps. Child alive, 8½ pounds.	16 hours. Attempts with forceps.	Conj. V. 8.5 cm.	1	...	.....	...	1	Head injury, 5th day.	10 pounds 8 ounces.	

Fry.	2	I	S.	.....	24 hours. Attempts with forceps.	Conj. V. 8.5 cm.	...	1	Septic phlebitis. Emb. heart. 11th day.	...	1	Head injury.	9 pounds.		
Williams.	1	V	P.	1. No record. 2. Fetus macerated, 7 months. 3. Fetus macerated, 7 months. Version.	2d stage 5 hours. Slightly engaged.	Rachitic. Conj. diag. 11 cm.	1	...	.....	1	...	.....	8 pounds +.	2	
Williams.	2	I	P.	.....	Breech. Foot prolapsed. Man. dilatation cervix.	Rachitic. Lordosis lumbar. C. D. 8.75 cm.	1	...	.....	1	...	.....	6 pounds +.	2	
Williams.	3	I	P.	.....	Breech. 2d stage some time and not descended.	Conj. diag. 10 cm. Pubic arch narrow.	1	...	.....	1	...	.....	5 pounds +.	2	
Williams.	4	I	P.	.....	Labor. 2d stage 2½ hours. No engagement head.	Flat, rachitic. Conj. 8 5 cm.	1	...	.....	1	...	.....	6½ pounds.	2	
Williams.	5	I	P.	.....	2d stage 3 hours. Head not engaged.	Genl. cont. rachitic. Conj. diag. 9 cm +.	1	...	.....	1	...	.....	5 pounds.	2	
Williams.	6	II	P.	1st premature. 7th month.	2d stage several hrs. Breech not engaged.	Genl. cont. rachitic. Conj. diag. 9.75 cm.	1	...	.....	...	1	.....	8 pounds.	2	
Williams.	7	I	P	.....	2d stage 2 hours. Head not engaged.	Genl. cont. rachitic. Conj. diag. 9.5 cm.	1	...	.....	1	...	.....	6⅔ pounds.	2	
Bill, A. H.	1	V	S.	1. Craniotomy. 2. Spontaneous at 8 months. Wgt. 6 pounds, and died 8th month. 3. Miscarriage at 4 months. 4. Miscarriage at 4 months.	30 hours. Axis traction failed.	Simple flat pelvis. Conj. V. 8 cm.	1	...	.....	1	...	.....	9 pounds.	2	

1. Amer. Jour. Obst., 1904, vol. i, No. 3.
2. Personal communication.
3. Amer. Jour. Obst., vol. liv, No. 6.
4. New York Medical Record, May 26, 1906.
5. Canadian Pract. and Rev., 1907, xxxii, 17.
6. New York Med. Jour., March 30, 1907.

INDUCED LABOR AND DELIVERY BY ABDOMINAL SECTION.

By Edward P. Davis, M.D.,
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Among obstetrical operations there is none which, in selected cases, gives better results than the induction of labor. This is especially true in disproportion between mother and child, whether caused by pelvic contraction, excessive fetal size, or prolonged pregnancy. Private patients are especially benefited by this operation, as they usually come early under the care of the obstetrician, and give him a better opportunity to study their cases than do hospital patients. Private patients who have passed through disastrous first confinement are often safely delivered in subsequent labor by the induction of labor.

Experience, however, and the study of statistics, show that induction of labor is not without serious disadvantages; it is a process uncertain in duration, often exposing the patient to considerable loss of rest and to prolonged suffering. Labor is rarely terminated without some active interference, and this is most often to be accomplished through a cervix poorly prepared for dilatation. Some of the methods employed to terminate induced labor produce unfavorable presentations and positions of the fetus, increasing the risks to mother and child. While it is possible, considering the interests of the mother first, to have a low mortality and morbidity rate for her, the best results, so far published, give a very considerable

mortality and morbidity for the infant. We believe that the induction of labor compares in gravity, when the interests of both mother and child are considered, with other major obstetrical operations.

The following cases in the experience of the writer illustrate these statements:

Case I.—Primipara; justomajor pelvis, three hundred days' gestation; induced labor terminated by the use of bougies, a large elastic bag, and the forceps. The child weighed ten and one-half pounds. Mother delivered with but slight injury; immediate repair.

Case II.—A frail young woman with justominor pelvis, external conjugate, 18½ cm.; had during her first pregnancy pernicious nausea and vomiting. This pregnancy terminated by the preparations made for induced labor, at two hundred and twenty-eight days' gestation, the child weighing 4 pounds 2 ounces.

The second pregnancy terminated by forceps at eight months' gestation, the child weighing 6 pounds 2 ounces.

The third pregnancy was allowed to go to eight months, when preparations were made to induce labor. These preparations excited labor pains, and the patient was spontaneously delivered of a living child, weighing 6 pounds 12½ ounces. This patient is the wife of a physician and was formerly a nurse. She understands thoroughly the reason for the induction of labor; and labor seems induced in her case, as much by mental suggestion as by the introduction of bougies.

Case III.—A rather frail, ill-nourished woman, with justominor pelvis, external conjugate, 18½ cm. In her first pregnancy the question of the mode of delivery was seriously considered, and various methods of treatment were submitted to her and her husband for a choice. Induction of labor was selected. The first labor occupied four days, and was conducted by the introduction of bougies, the use of dilating bags, and the employment of forceps. The occiput rotated pos-

teriorly, and a male child weighing 6¼ pounds was safely delivered. The biparietal diameter of the head measured 8½ cm.; slight lacerations resulted which were immediately closed by suture.

Her second pregnancy was terminated at two hundred and sixty-one days' gestation by the same methods; the duration of labor was about twenty-four hours. A male child weighing 6¾ pounds, 49 cm. long, was safely delivered; the biparietal diameter was 8¼ cm.

These children have done well, but have been more than usually subject to infection of the throat and ears. The mother remains in perfect health.

Case IV.—This patient's pelvis measured: Anterior superior spines, 24.5 cm.; crests of the ilia, 28.5 cm.; trochanters, 33 cm.; diagonals, 24 cm.; external conjugate, 21 cm.; circumference, 99 cm.; between the spines of the ischia, 15.5 cm.

The patient is a woman of more than average intelligence and of excellent courage. She is, however, so sensitive to pain that uterine contractions completely paralyze the voluntary and essential forces of labor. Her husband is a remarkably well-developed man, having a large cranium, excessively broad.

Her first pregnancy terminated at full term in prolonged labor, with failure of expulsive forces, and the application of forceps followed by the death of a large, male child. The lacerations were closed by secondary operation, and when the patient found herself again pregnant, she came under my charge. The first child was not weighed.

The second pregnancy was terminated by the induction of labor at two hundred and sixty-two days, although the pelvis is above the average in size. The patient did not choose the induction of labor, but was willing to undergo any operation, including section. Induced labor was based upon the patient's lack of expulsive force, the development of the husband, and

the unusual size and development of his cranium. This induced labor was conducted by the introduction of bougies, of elastic bags, and by the use of forceps. Forty-eight hours was consumed in labor, which terminated in the birth of a vigorous male child weighing 9 pounds.

The third pregnancy was terminated by induced labor at two hundred and fifty-seven days, by the same methods, resulting in the birth of a female child, weighing 8 pounds.

The fourth pregnancy was terminated at two hundred and fifty-seven days' gestation by the same methods, with the birth of a vigorous male child, weighing 8 pounds, 5 ounces. This child was 49 cm. long; the biparietal diameter of the cranium, 9.5 cm. This labor occurred during a period of intense heat in August, and as there was some tendency to hemorrhage the uterus was packed with iodoform gauze. In spite of this a large clot formed between the fundus and the gauze, but serious hemorrhage did not occur. The mother and the three children are in remarkably vigorous health.

These cases fairly illustrate what may be accomplished in many cases by the induction of labor in private patients. Every facility was afforded in the houses of these patients, and a complete hospital technique in anesthesia, asepsis, and antisepsis was employed. Abundant assistance was secured, and the cases were conducted as if in hospital.

Induced labor, however, does not always terminate so successfully.

Case V.—A small, poorly nourished woman, aged thirty-three years, the wife of a physician. The pelvis measured: Anterior superior spines, 22 cm.; crests of the ilia, 24.5 cm.; trochanters, 33 cm.; left oblique diagonal, $20\frac{3}{4}$ cm.; right oblique diagonal, 21 cm.; external conjugate, $16\frac{7}{8}$ cm.; circumference, 80 cm.

The patient had had a spontaneous abortion from which she made a good recovery. During her second pregnancy, the method of delivery to be selected in her case was thor-

oughly canvassed by the patient and her husband; the disadvantages of the various methods of delivery were stated as fully as possible. The cervix uteri was poorly developed, but little softened, and the case was unfavorable for the induction of labor. No other procedure, however, was favorably considered by the patient and her husband, and the induction of labor was demanded. The patient entered a hospital, having a private room and special nurse. At two hundred and twenty-four days' gestation, as nearly as could be calculated, the patient was anesthetized with chloroform, and the cervix dilated with metal bougies. Dilatation was difficult and was accompanied by hemorrhage; the membranes were not ruptured and were separated extensively from the lower portion of the uterus, and several bougies were introduced. These remained in the womb forty-eight hours without exciting labor pains. They were then removed and a packing of iodoform gauze carried through the cervix and firmly applied about the cervix. On the following day the membranes ruptured spontaneously, without appreciable uterine contraction. As labor did not develop on the day following, the patient was again anesthetized, the cervix dilated as much as was thought safe, with Newell's dilator, and a good-sized elastic bag introduced and distended. No uterine contractions developed when the patient came out from the anesthetic. She suffered intensely from pain, and was threatened with exhaustion. The temperature rose to 101°; the pulse to 120. The uterus seemed to be in a partially tetanic condition, and the bag caused so much suffering that it was removed. The cervix softened and dilated very imperfectly, and efforts to hasten labor were abandoned and the patient given morphine to secure sleep. On the following day she had severe vomiting, with absence of uterine contractions. On the next day, five days after the introduction of the bougies, the cord prolapsed and a shoulder presentation developed; uterine contractions gradually occurred; the patient was

anesthetized by ether; the cervix cautiously dilated by the hand; and a dead and partly macerated fetus was delivered by version and extraction. Intravenous saline transfusion was given; the patient rallied well and made a good recovery. The cervix was considerably torn, but was immediately repaired after delivery, and the lacerations healed without infection.

A few months after, conception again occurred. The patient and her husband declined to make suggestions or choice concerning a method of delivery, except positively to decline induction of labor. After discussing craniotomy, forceps delivery, and section, they selected section, and against my advice, requested that further impregnation be made impossible by hysterectomy. The patient was accordingly brought in the best possible condition during pregnancy, and spontaneously labor began, as nearly as could be calculated, eight months and eleven days after conception. The patient was brought by her nurse immediately to the Jefferson Maternity, where celiohysterectomy was performed. A vigorous female child, weighing 7 pounds 14 ounces, was safely delivered. On the left side of the pelvis the descending bowel was adherent over a considerable area to the pelvic tissues.

During convalescence the patient nursed the child successfully. Partial necrosis of the stump occurred, which caused a vaginal discharge for several weeks. There was no infection. Although the tubes and ovaries were removed with the body of the uterus, two months afterward the patient had what seemed to be a menstrual flow, with the discharge of a small clot. She has made a complete recovery, and the mother and child are in excellent health. She has suffered some annoyance from flushing with sensations of heat, but this has completely subsided.

In this case I advised strongly against hysterectomy. It was explained to the parents that should the child live and

arouse great interest and affection, and then die, that they might regret the impossibility of further procreation. At the present time, they state that the child is so great a pleasure to them that they wish there was the possibility of others.

In this case every facility was afforded for the successful induction of labor. The poorly developed birth canal made the induction of labor, in my opinion, a far more dangerous operation than section. Experience taught the patient and her husband that this view was correct.

Case VI.—A woman inheriting a vigorous constitution, became pregnant soon after marriage. She was inclined to be fat, and exceedingly luxurious in her habits. She carefully avoided exercise, ate rich food, and although inheriting a good physique, was soft and flabby. During the early months of her first pregnancy she developed a typical, specific infection. Although appropriate treatment was prescribed, it was very difficult to induce the patient to take the remedies proposed. This pregnancy terminated in the spontaneous expulsion of a macerated fetus, at about nine months. The placenta showed lesions characteristic of specific disease. The husband stated that he had been infected before marriage, but had been pronounced cured by his physician. The patient recovered from the specific infection without secondary lesions, and remained in her accustomed health.

She then had two pregnancies at intervals of eighteen months, each terminating in early spontaneous abortion. She was treated on these occasions by thorough curetting under anesthesia. For these operations, a skilled anesthetizer was selected, as the patient took ether badly, having profuse bronchial catarrh, and becoming readily cyanosed. She recovered from these abortions and remained in her accustomed general health.

When her fourth pregnancy developed she realized the importance of antispecific treatment, and took the remedies ordered faithfully. Her confinement was expected last

autumn, and during the summer, in a suitable climate, her general health was exceptionally good. Her mode of living, however, and the absence of exercise, remained the same. Her pelvis was of average dimensions and symmetrical.

As nearly as could be estimated she went to full term without signs of labor. Anticipating difficulties, various methods of treatment at labor were discussed with the patient. She was exceedingly apprehensive and anxious that pregnancy should terminate. She would not listen to the possibility of section under any circumstances. She earnestly desired the life of the child, as it seemed possible that the child might survive. Judging from the heart sounds, the child was of average vigor and development.

Accordingly, at her request, labor was induced. Under partial anesthesia, bougies were introduced, and twelve hours later the cervix was found considerably softened and slightly dilated. Uterine contractions did not develop. Dilating bags were then employed, but the cervix was excessively resisting. Twenty-two hours after the induction of labor a large-sized Voorhees' bag was introduced and gradually distended. When considerable pressure was exerted the bag burst. The cervix was then more than one-half dilated, the membranes unruptured, the patient having irregular pains, of which she loudly complained, and impatiently urged the termination of labor. Twenty-four hours had passed since the beginning of labor. Anticipating difficulty, the patient was put in charge of a skilled surgical anesthetizer who had given her ether successfully once before. With abundant assistance, preparations were made to deliver by forceps or to perform craniotomy. Under ether the cervix was dilated with great difficulty by the two hands, the membranes having been ruptured an hour previously to secure uterine contraction. The occiput rotated posteriorly and could not be turned to the pubes. Multiple incisions were made in the cervix, and a living female child, weighing 8 pounds, was

delivered, the occiput remaining posterior. During delivery the mother became somewhat asphyxiated, and labor was expedited as much as possible. The cervix was somewhat lacerated and also a central tear of the pelvic floor to the vulva, but not into the rectum, occurred. The placenta was immediately delivered, the lacerations quickly closed, and the patient speedily recovered consciousness. The action of the heart was not satisfactory, and shortly after labor the patient was greatly distressed by a profuse bronchial and nasal catarrh. The right heart became overburdened, and the patient died about two hours after delivery, remaining conscious until just before death, but complaining of great dyspnea. Stimulation was abundantly given hypodermically, oxygen was employed, artificial respiration practised, but nothing which was done had the slightest effect. The child survives in excellent health.

Those who have had considerable experience in dealing with difficult cases of labor have sometimes been obliged to terminate induced labor by section. In fact, it is a wise and justifiable procedure in all complicated cases to be prepared for section during an induced labor.

The writer would strongly urge the importance of conducting cases of induced labor in such a manner that the patient shall be in favorable condition for a major operation if necessary.

We do not believe it justifiable during inducd labor to make efforts at delivery by forceps or version unless the conditions are such as to make it reasonably certain that these operations will be immediately successful. If engagement of the head does not develop during induced labor the use of the forceps is a dangerous procedure. If the operator is sure of the size and contour of the pelvis, and reasonably certain of the comparative size of the fetus, version, where the head does not engage, is the safer operation. The writer would not resort to delivery by section in a case where efforts at delivery

by forceps or by version had been made. We believe that with careful antiseptic technique it is possible to introduce bougies within the uterus, or even to employ dilating bags without infecting the patient. These procedures should not cause lacerations and should not essentially wound the epithelia of the genital tract. It is impossible, however, to make tentative traction with forceps, or to practise the manipulations necessary in attempting version without producing lesions in the genital tract through which infection may enter. It is our practice then to decline celiohysterotomy in all cases where forceps or version has been tried.

In severely septic cases, the child being dead and unsuccessful efforts having been made at delivery, we believe the Porro operation will give the best results.

In cases where forceps or version has been tried without success, if the child is living, we believe that the consultant should again try whichever of these procedures he thinks best, utilizing Walcher's position if advisable, failing in which craniotomy should be done.

In reviewing my deliveries by abdominal section I find:

Case VII.—A young primipara, with justominor pelvis, true conjugates, 9 cm.; labor was induced at the Maternity by the introduction of bougies; labor became vigorous, but the cervix and lower uterine segment were so poorly developed and inelastic that it was thought dangerous to attempt artificial dilatation. The patient was delivered by section, and during the extraction of the child the uterine tissue, which was poorly developed and thin, tore and it was necessary to perform hysterectomy. The mother and child made a good recovery.

Case VIII.—Primipara; dwarf; justominor pelvis; true conjugate, 7¾ cm. Labor induced at the Philadelphia Hospital, As dilatation did not develop, and the head did not engage. the patient was delivered by section. Mother and child made a good recovery.

Case IX.—Patient in second pregnancy; had been previously delivered at seven months, after three days' labor, of a child that soon after died. Justominor pelvis; external conjugate, 17 cm.; induction of labor by bougies; followed by complete dilatation, with strong pains. Engagement and descent failed, and the patient was successfully delivered by section. Mother and child made a good recovery.

Case X.—Primipara; justominor pelvis; external conjugate, 18 cm.; patient between seven and eight months' pregnant. Labor induced by bougies. After ample time had been given for dilatation and engagement the patient was delivered by section. The child's cranium was rachitic; biparietal diameter, 9.5 cm. Mother and chlld recovered well.

Case XI.—Patient, aged fifteen years; dwarf; justominor pelvis; internal conjugate, 8 cm.; pregnancy in the ninth month, when the patient was admitted to the Maternity.

The case seemed favorable for the induction of labor, bougies were inserted, labor pains developed, dilatation became complete, but without engagement and descent. Symphyseotomy was performed and the child successfully delivered. Mother and child made a good recovery, the pelvis remaining permanently enlarged, from 0.5 to 1 cm., in several diameters.

Case XII.—Primipara; badly nourished; was about eight months' pregnant, with cervix small, resisting, inelastic, and poorly developed; patient highly toxemic. As her toxemia grew worse labor was induced. Great difficulty was found in dilating the cervix sufficiently to introduce bougies. Complete dilatation of the cervix was impossible without very serious laceration. Shortly after the introduction of bougies, labor pains developed, followed by eclampsia. The patient was at once delivered by section. Mother and child survived delivery a few hours.

This case illustrates the danger of interfering with the uterus

in highly toxemic patients. The patient was the daughter of a physician and under the care of a medical man, and the obstetrician was urged to deliver her as soon as possible.

Among the recent papers upon the subject, that by Möller from the clinic at Copenhagen, is especially interesting (*Archiv f. Gynäkologie*, 1906, Band lxxx, Heft 3):

Labor was induced in these cases for disproportion between mother and child, the indication which is considered most favorable for this procedure. In 21,066 cases of labor, 646 patients had pelves considerably contracted. Among these, 80 cases were selected for the induction of labor. The most frequent variety of pelvic contraction was the justo-minor, which is the variety of contracted pelvis most commonly found in this country. In 2 cases, contraction in the birth canal outside the pelvis was present.

In 67.5 per cent. the head presented; in 32.5 per cent. the breech presented. Among the head presentations, 14 had abnormal and unfavorable rotation, and of these 10 were cases in which elastic bags were used as dilators; 47.5 per cent. of these cases ended with some form of instrumental delivery, with a maternal mortality of 1.25 per cent.; the maternal morbidity was 33.75 per cent. or 27 cases; of these, 8 became septic.

Among the children 18.75 per cent. were stillborn—a very considerable mortality. It was thought proper to induce labor for disproportion when the true conjugate was above 7 cm., and the period most favorable in the average case was thirty-five weeks of gestation. When the child's head presented, 90.7 per cent. of the cases were born alive; when the breech presented, 61.5 per cent.

The objections to induced labor found in this experience were injuries occurring during operative delivery to mother and child, and the difficulty in choosing exactly the best time for the induction of labor. These cases were followed as closely as possible, and it was found that after one year 20

per cent. less of these children were living than of children delivered by other methods.

The question will naturally be raised: Shall not the induction of labor be supplanted by dilatation of the cervix with Bossi's or some other dilator, or by the performance of vaginal Cesarean section? To this we reply that in the cases cited as illustrating the failure of induced labor, we have drawn attention to the fact that the cervix was so inelastic and ill-developed that dilatation with metal dilators was excessively dangerous. Furthermore, vaginal Cesarean section does not remove the pelvic deformity. The child must still pass through the pelvis to be delivered by vaginal Cesarean section, and when the head of the child does not engage in the pelvis, we fail to see any possible advantage in vaginal Cesarean section. While Bossi's dilator and other similar dilators, and vaginal Cesarean section, have a distinct field and are valuable additions to obstetrical art, they do not remove the dangers of pelvic delivery. Such are, as exemplified in the cases reported, extensive injuries to the cervix, pelvic floor, and perineum, unfavorable position of the fetal head, the development of shoulder presentation with prolapse of the cord followed by fetal death, and the exhaustion and shock consequent upon difficult, pelvic delivery. We fail to see how the perfection of technique in dilatation, or incision of the cervix and lower uterine segment, can obviate the mechanical difficulties inherent upon the disproportion between mother and child, whether such disproportion arose from pelvic contraction or excessive fetal size.

In cases where the parents are very solicitous for the life of the child, they will sometimes select delivery by abdominal section to avoid the uncertainties of pelvic delivery.

Case XIII.—A remarkably vigorous and athletic woman, and a very skilful rider, went to full term in her first pregnancy. Her pelvis was long, and while ample at the brim, was narrowed somewhat toward the outlet. Riding after the

hounds and jumping had caused excessive development of the pelvic floor. The first labor began spontaneously, and was terminated in the presence of threatened exhaustion by a very difficult forceps extraction. The vertex was rotated anteriorly, but the resistance of the pelvic floor was extreme. The child was a large male and survived, and mother and child made a good recovery. The child died about eighteen months after birth from tuberculous meningitis.

During the second pregnancy, it was necessary to replace the retroverted, gravid uterus. Methods of delivery were discussed, the parents especially desiring to avoid, if possible, the difficulties of the first labor. The induction of labor was requested, hoping that the child might be smaller, and thus risk to life be avoided. Accordingly labor was induced by the introduction of bougies, and twelve hours afterward the cervix was found very slightly softened, but little dilated, membranes unruptured, and the patient having nagging and exhausting uterine contractions. At this point the case was again submitted to the consideration of husband and wife, with the statement that the child was probably not so large as the first, that it would undoubtedly be possible to deliver this child through the pelvis, but that the head had failed to show signs of engagement, that the mechanism of labor would very likely be abnormal, and the risk to the child considerable. As the mother bears pain very badly it would be necessary to anesthetize her to dilate the cervix in any manner, whether by elastic bags or by more rapid dilatation.

My experience in cases of section uninfected before labor numbered at that time forty, with a maternal mortality of 2.5 per cent., or one mother, and without mortality among the children. This was stated as an illustration of what could be done by abdominal delivery. A consultation was asked for, but was refused by the parents. The grandparents, who could be reached, were immediately consulted, and the family decision ended in a request for abdominal section. This was

immediately performed in the patient's bed-room, by summoning the staff of the Maternity, and by the use of portable sterilizers with previously sterilized dressings. A healthy female child, weighing about 8 pounds, was delivered. The mother and child made good recoveries.

In this case the operator took special care to avoid urging the claims of abdominal section. So great was the desire of the parents for a living child, that it was thought but just to them to state the case fully, and to allow them to choose the method of delivery. Much to the surprise of the operator, abdominal section was preferred.

Pubiotomy is at present under trial as a method of delivery for disproportion. The advantages claimed for this procedure are a small and insignificant wound, and prompt enlargement of the pelvis which becomes permanent and permits of possible spontaneous labor in the event of subsequent pregnancy. The disadvantages found in this operation are the occurrence of bleeding, with the formation of hematoma, injury to the bladder, lacerations opening into the vagina, and the disadvantage common to all cases of delivery through the pelvis, namely, abnormal mechanism with possible injury to the fetus.

These disadvantages are those common to symphyseotomy, but it is alleged that they are less serious and frequent. The writer's experience in symphyseotomy numbered 8 cases. The results were fairly satisfactory, but did not compare favorably for mother and child with the results of delivery by abdominal section. Bleeding is more common after pubiotomy than symphyseotomy, especially if the latter be performed by the so-called open method. Injury to the vagina is common to both operations in primiparous patients. Abnormal mechanism of labor is common to both. Injury to the bladder may occur in both, and both operations are followed by permanent enlargement of the pelvis. Pubiotomy is thought superior because of giving bony union, and greater

firmness to the pelvis, when the patient walks after the operation. After symphyseotomy the union is frequently ligamentous, when it is thought that the pelvis may move as the patient walks. In the writer's experience, firm union occurred in the symphysis in several cases.

Bill (*Surgery, Gynecology and Obstetrics*, July, 1906) adds the cases collected by Gilgi and Kannegieser, and 11 additional, 157 in all, with 8 deaths—a maternal mortality of 5 per cent. Of these 8 deaths, 5 were from septic infection. In Kannegieser's collection of cases, numbering 23, 4 children died—a fetal mortality of 17 per cent.

Among the very considerable literature on the subject may be cited the paper of Henkel, *Zeitschrift f. Geburtshülfe und Gynäkologie*, 1906, Band lvii, Heft 1. He illustrates by anatomical drawings the method of operation, reporting 7 cases. One of these was twin pregnancy; in 1 the bleeding is described as very severe, and the puerperal period was complicated by prolonged fever; one mother died of septic infection, her child surviving; in 1 case a severe forceps delivery after pubiotomy tore the vagina into the pubiotomy wound.

A remarkable case illustrating the injuries which may accompany pubiotomy is reported by Rühl, *Monatsschrift f. Geburtshülfe und Gynäkologie*, 1906, Band xxiv, Heft 3. The patient's first labor had been terminated by craniotomy. The patient's pelvis was so small that she had been advised to enter a hospital for section. The pelvic measurements are not given. The patient remained in her own home, and the operator found the membranes ruptured, the head movable, the cervix dilated, and the true conjugate 6.5 cm., the pelvis being flattened and contracted in all diameters. As a living child was greatly desired, the operator, who had successfully performed two pubiotomies, undertook the operation. Doederlein's needle was used and the bone severed with but little hemorrhage. The child was delivered by

forceps, with the vertex anterior. There occurred, however, an extensive laceration of the perineum and pelvic floor with laceration of the vagina and bladder. The mucous membrane of the bladder and urethra was widely opened, the cut ends of the bone presenting in the wound in the vagina. Sutures were inserted as well as possible, and where the tissues could not be brought together successfully, iodoform-gauze packing was employed. A catheter was placed in the bladder. The patient made an unexpected recovery, having, however, a vaginal fistula and paralysis of the neck of the bladder and urethra.

Henkel, whose paper has already been cited, believes that the maternal mortality, up to the present time, is between 6 and 7 per cent. In one remarkable case he first performed pubiotomy, and then finding a placenta previa, he delivered by vaginal Cesarean section.

Hocheisen (*Archiv f. Gynäkologie*, 1905, Band lxxx, Heft 1) reports 16 pubiotomies at Bumm's clinic at Berlin. Bumm's needle was inserted between the greater and lesser labium, starting from below. The bone was severed by a saw, the patient's limbs being held together during the operation. A catheter was placed in the bladder. Two severe lacerations occurred, but the hemorrhage was controlled by sutures. The bladder was injured in one case; hematoma formed in the vulva several times. The nearer the incision is made to the symphysis the greater is the enlargement of the pelvis. A permanent gain in the true conjugate of about 1 cm. was observed. Some patients after recovery could not separate the legs freely, and some had prolapse of the anterior vaginal wall and uterus.

Scheib (*Deutsche medicinische Wochenschrift*, 1906, Nr. 43) reports 11 cases from the clinic at Prague. He has also collected 170 cases from various sources. His 11 cases were successful so far as the mothers were concerned, with the death of one child. Lacerations of the vagina occurred, sometimes

communicating with the divided bone. In one case severe infection followed this action.

Reifferscheid (*Centralblatt f. Gynäkologie*, 1906, Nr. 12) reports 7 pubiotomies from the clinic at Bonn, with the recovery of the mothers. One of them suffered with thrombosis of the left thigh; another had fever for three days; another had thrombosis of the larger veins of the left thigh; and one child died.

Stoeckel (*Centralblatt f. Gynäkologie*, 1906, Nr. 3) reports 2 operations. Bossi's dilator was employed in both cases, and one of the children perished.

Kroemer (*Centralblatt f. Gynäkologie*, 1906, Nr. 8) reports a case with true conjugate of 8 cm., previously delivered by forceps with Walcher's position. After pubiotomy an extensive laceration of the vulva and vagina occurred. During the puerperal period, edema of the vulva, hematoma, and fistula of the bladder complicated recovery. On the twenty-third day after operation the patient was discharged, the fistula having practically closed.

Jessen (*Centralblatt f. Gynäkologie*, 1906, Nr. 8) attempted pubiotomy, and in passing Seeligman's needle, followed by the saw, the greater labium was extensively wounded, followed by severe hemorrhage. When the bone was three-quarters severed by the saw the saw broke. The operator then opened the symphysis without hemorrhage. The child was successfully extracted and the symphyseotomy wound healed promptly. The cut edges of the bone remained sensitive for a long time without the formation of callus.

In the same journal, Seeligman reports 2 successful cases. Reifferscheid (*Centralblatt f. Gynäkologie*, 1906, Nr. 18) reports one case in which he first performed pubiotomy. The patient came the second time to the clinic for delivery, her pelvis showing an increase of 0.5 cm. in the external and internal anteroposterior diameter, as the result of the first operation. Where the bone had been severed the ends could be moved

one upon the other. There was slight depression at the site of the first incision. Labor progressed with the head remaining movable above the pelvic brim. Gigli's saw was inserted as a prophylactic measure without severing the bone. Version was then performed. Some difficulty was experienced in delivering the arms, the head passing without great difficulty. At the moment when the head was delivered the ends of the bone formerly severed separated the width of a finger. Mother and child recovered.

An *x*-ray picture of the pelvis illustrated the fact that firm union had not occurred at the site of the original incision.

Hohlweg (*Centralblatt f. Gynäkologie*, 1905, Nr. 42) reports 4 pubiotomies; 3 of them resulted successfully without severe complications. In one of them firm union from the severed bone did not occur; in the fourth patient, severe laceration occurred in the vagina, followed by septic infection and death.

Reifferscheid, in the same journal, reports 4 cases, one of them complicated by a severe laceration of the vagina communicating with the pelvic wound.

Reeb (*Centralblatt f. Gynäkologie*, 1905, Nr. 41) reports 4 cases, one of which has already been described. Bürger (*Centralblatt f. Gynäkologie*, 1905, Nr. 27) reports 2 cases from Schauta's clinic in Vienna. This operation resulted successfully for mother and child. Firm union did not occur in one of the patients who had rachitic pelvis.

Küstner, in the same journal, reports 2 cases, 1 of them complicated by thrombosis of the pelvic veins. The patient's convalescence occupied sixty-six days.

Meyer, of Copenhagen (*Centralblatt f. Gynäkologie*, 1903, Nr. 13), operated by the open method, suturing the bone with silver wire successfully.

We have not attempted to make a complete summary of the extensive literature of pubiotomy. A sufficient number of cases has been cited to show that the operation, like all

other surgical procedures, is not without its dangers and disadvantages. A maternal mortality of from 5 to 7 per cent., and a fetal mortality of 17 per cent. indicate its severity.

A further factor to be taken into consideration in surgical procedures is the thoroughness and completeness of a given operation. Pelvic delivery, to be completely successful, must leave the patient with wounds surgically closed, hemorrhage prevented, and the patient in an aseptic condition. No operation in other branches of surgery can be considered satisfactory which does not accomplish this. In addition, the obstetrical surgeon, to be completely successful, must deliver the child living and in good condition. It is difficult, in many cases of pelvic delivery, to satisfy these criteria of success.

We have no disposition to minimize the difficulties of delivery by abdominal section. It is true that the uterine muscle is left with a scar which may not be as strong as the original structure. Sutures have parted in the uterine muscle allowing fatal hemorrhage; infection has occurred in some cases, and hernia of the abdominal wound may develop.

When, however, all things are considered, and especially when the fetal mortality is taken into consideration, the claims of abdominal section for safe delivery of mother and child cannot be disregarded. We do not believe that at the present time a dogmatic opinion can be formed concerning any one method of delivery. Another factor of importance is the value placed by parents upon the life of the child. It is our belief that the operator in dealing with married persons, should thoroughly examine cases if possible before labor, and anticipate difficulty if pathological conditions are present. The fact should be communicated to those responsible, the results of different methods of delivery should be stated, and an effort made to secure a fair and intelligent choice. The operator should frankly state his experience in the major operations, and his results. A decision may then

be reached which shall do full credit to obstetrical surgery and at the same time consider the rights of the parents.

We are sometimes urged to refrain from advocating methods of operative delivery, because they cannot be successfully followed by the general practitioner, into whose hands many cases of confinement come. The same reasoning would prevent the advocacy of operation for appendicitis, infection of the gall-bladder, hernia, ectopic gestation, and fracture of the skull. The general practitioner is quite as competent to deal with these as he is with a complicated case of labor. It is my belief and practice in teaching that our graduates should be taught to recognize abnormalities and complications, and then to secure for their patients such aid as the case may require. If a physician is ambitious to do obstetrical surgery, he must qualify himself for this work by an experience similar to one who develops a practice in abdominal or general surgery. In the course of a few years we shall have abundant statistics, giving the results of various obstetrical operations for mother and child. Fetal statistics are at present imperfect and mostly lacking in the operation of pubiotomy. We can then compare better the results of this operation with those of delivery by abdominal section.

DISCUSSION ON THE PAPERS OF DRS. REYNOLDS, FRY, AND DAVIS.

Dr. Egbert H. Grandin.—I have listened with great pleasure to Dr. Reynolds' paper because his conclusions and line of argument are absolutely in accord with those which I reached in a thesis presented to this Society seventeen years ago, entitled "A Plea for the Elective Cesarean Section." I then contended that the operation was an ideal one, and after seventeen years it still remains the ideal operation. The reason is this: While the average general practitioner is the recipient of proper teaching he is not, as a rule, the accipient. He takes food, but does

not digest it, and until the general practitioner is taught to send for a skilled abdominal sectionist, before other methods (forceps, etc.) have been tried and failed, the elective Cesarean section will not be established as the ideal operation either in the minds of the profession or in the minds of the laity. A Cesarean section is the simplest operation in the whole range of surgery. There is no vessel to be tied, and all the operator has to know is how to sew up the uterine incision, and I will state here, that when the incision breaks down, it is probably because of the fault of the operator in not knowing how to tie his catgut.

Another reason why the elective Cesarean section has not yet secured the hold which it may some time secure is because of the difficulty we are up against in determining the size of the fetal head. We can measure accurately the pelvis, but we cannot measure accurately the fetal head, although a near approach to a method was offered to us last year by Dr. Stone, of New York.

I have been invited to witness two elective Cesarean sections, but before I got to the hospital the child was born per vias naturales.

As regards pubiotomy, while I wrote to Dr. Fry about it, I have never done it. What I tried to write to Dr. Fry was this, that I would favor pubiotomy over symphyseotomy, even though I have had two symphyseotomies, with living mothers and living children, and, so far as I know, without disability on the part of the women. Since elective Cesarean section is usually refused in private practice, not to speak of hospital practice, my own preference is for induced labor after a predetermined method. As long as the woman is under observation, and the fetal head can be made to engage in the pelvic brim, the induction of labor is not indicated, in my judgment. When, however, there is difficulty in making the head engage, then the induction of labor is indicated—but after a surgical fashion. I am opposed to mechanical interference with the interior of the uterus, such as the bougie, because we aim to keep the membranes intact in order to do elective version after dilatation has been secured, and the bougie is apt to rupture

them. Frequently, too, it fails to induce labor. The method I have used for years is under anesthesia to dilate the cervix with a steel dilator, next packing the cervical canal up to the internal os with sterile gauze, and then the vagina. After twenty-four hours the gauze is removed and, as a rule, the vaginal portion of the cervix has disappeared. Dilatation is completed by the hand, under anesthesia, and I perform version, rupturing the membranes high up, and deliver. That method has given me very excellent results. I cannot conceive of vaginal Cesarean section being called for where the head is movable above the brim. When the head is partly engaged, perhaps in preference to symphyseotomy, certainly in preference to futile attempts at the use of forceps, I might do vaginal Cesarean section. The average general practitioner sends for you and me to do Cesarean section after he has tried to do the impossible, that is, attempted version and forceps, while, if he had the proper knowledge of the conditions, he would not have done so. Cesarean section, therefore, is not infrequently performed on an exhausted woman, in whose case forceps had been used, and every time you insert the forceps you run the risk of infecting the woman, and we are bound to have a high mortality rate. My experience with Cesarean section has been six elective cases, with six maternal recoveries and six living children. My experience in delayed Cesarean section has been limited to three cases, one maternal death and three dead children. The moral is evident. An elective Cesarean section should not, nowadays, carry a mortality rate. Solve the problem of the relation of the fetal head to the pelvis and train the student to stay his hand under conditions where the elective section is indicated, and the operation ceases to be an ideality.

Dr. A. Lapthorn Smith.—I heartily endorse what has been said by the readers of the papers, although I wish to condemn pubiotomy particularly. I think Dr. Fry has condemned it in his paper. I believe Cesarean section safer for the women.

Last summer I performed two Cesarean sections, and I can testify to the surprising ease with which the operation was done in both cases. In one case I removed the child, placenta,

and membranes all in one piece. The woman made a perfect recovery.

In the other case the woman had puerperal convulsions. She was comatose at six o'clock in the morning when there was no sign whatever of dilatation; I treated her with veratrum viride and morphine, but about four o'clock that afternoon the os being still closed and rigid, I did a Cesarean section, and although the child was not quite seven months old, it was put in an incubator and is now living and well. It is a fine, healthy child.

I endorse everything that Dr. Davis and Dr. Reynolds have said about not waiting too long, although in one of my cases I delivered a woman once with great difficulty with forceps, after having prepared her for a symphyseotomy. Twice she had craniotomy performed by three doctors, for the first and second child. Then after careful dieting so as to have the children small, two children were born without assistance after long labors. The sixth time, after trying forceps for an hour, I resorted to Cesarean section. She recovered, although the child died almost immediately afterward. It is difficult to say when a case is not suitable for the application of forceps, and it is difficult to decide on Cesarean section; but I feel that in doubtful cases we should try the long forceps, because sometimes we get children through with difficulty, and we ought to take every precaution to avoid infecting them and avoid inflicting undue violence.

Dr. James Clifton Edgar.—Many valuable thoughts have been brought forward from the three papers that have been presented to us this morning, and they certainly show a good deal of careful work.

The first thought that occurred to me was the relation of the mortality in the third class spoken of by Dr. Reynolds, who divided his cases into antepartum, early intrapartum, and late intrapartum. There is a question where we shall draw the line between Class I and Class II—that is, the frankly pregnant or antepartum cases and those early intrapartum cases—and I must confess, I am a little in doubt just where the line is drawn. Dr. Reynolds tells us from an analysis of his cases that he

gets a mortality in Classes I, II, and III of 1 per cent., 3 per cent., and 1.2 per cent. The thought occurred to me that if Class II, or the early intrapartum class, was moved forward, and the women were not allowed to stay in labor quite so long, the mortality of 3 per cent. would approach 1 per cent. in the intrapartum cases and the point I wish to make there is: It is a common observation, that in cases of frankly antepartum Cesarean section (I mean by that when the operation is undertaken in the latter part of pregnancy) there is difficulty in securing good drainage. We see it constantly. We see women in the wards of one of the hospitals with which I am connected suffering from a mild sapremia, and the reason for that and for other cases is difficulty in securing good drainage in the frankly pregnant cases. In my own cases I would prefer that the operation during pregnancy should be brought up to the preparatory stage of labor, if possible, or in the beginning of the first stage of labor, and no farther. And further statistics in years to come will show that if we elect time in the preparatory stage of labor, that mortality of 3 per cent. can be reduced by reason of the better drainage we secure at that time. Anyone who has had experience with primigravidæ in dilating the cervix, knows that at the time of the operation there is a good deal of traumatism connected with dilating the cervix sufficiently to secure good drainage in the subsequent puerperium, and it is customary with us in New York to put a piece of gauze in the cervix to carry out drainage as well as is possible to do so.

One further thought, Mr. President. While I agree with everything Dr. Reynolds said regarding the pelvis and fetal head, he has not made out his case as regards the prognosis of labor, that is, the muscular prognosis of labor. I still feel that the prognosis will depend upon the character of the pregnancy, and the pregnancy will determine, to a certain extent, the character of labor. But this is still an unknown quantity. For years we have been working along these lines. We have had placed on our history sheets or charts in one maternity hospital the obstetrical prognoses; that is, the internes, the students, and attendants are expected to put down during pregnancy certain notes as to what will be the probable character of labor in that

particular case, and it is remarkable to see how we have failed in predicting the character of the labor from the character of the pregnancy. We see it in private practice all the time. We see athletic women, not overburdened with adipose tissue, who are golf players, tennis players, and apparently whose every organ is in the best possible condition, go into labor, and they have to have everything done for them. The cervix has to be dilated, and we have to use intrapelvic means to terminate labor. So as regards that point we are still more or less in the dark with reference to prognosis.

As to the subject of pubiotomy, while I have had no personal experience with the operation, it does not appeal to me. I have had six symphyseotomies, and the reason I class pubiotomy with symphyseotomy is on account of the morbidity of the mother, not so much the mortality; and as Dr. Fry has said, a number of his cases suffered from phlebitis. We had a similar history with our cases of symphyseotomy. There was a large morbidity by reason of the large number of cases in which phlebitis occurred.

One of the most valuable parts of the paper of Dr Davis is as to the character of the cervix, and his point should be emphasized a good deal more strongly than we have heretofore emphasized it. There are certain primigravidæ whose cervices will resist the induction of labor, and, it seems to me, for that reason our limitations for the induction of labor, as the years go by, will become narrower and narrower, and we will induce labor less frequently and less early and later than heretofore by reason of such a cervix, and for one other reason, and that is, premature children will not stand much punishment. If we have a perfectly smooth confinement after the induction of labor, well and good; but if we have a cervix such as Dr. Davis has referred to, where it is necessary not only to use a Bossi dilator or other means of dilatation of the cervix and extract a premature child, that child at the thirty-sixth or thirty-eighth week will not bear the strain the same as a child would at the fortieth week, and for that reason the fetal mortality is much increased by the induction of premature labor over what it would be in labor at term.

Dr. Robert A. Murray.—It is with great pleasure I have listened to the suggestive papers that have been read on these

subjects, and I think the time has come when, as Dr. Reynolds puts it, we should collate what experience we have had and get definite ideas as regards what we can suggest to our patients, both in hospital and private practice. It has come to pass that we should suggest and point out to our private patients, as well as to those in hospital practice, the necessity of having living children. Again, these comparative statistics have been wonderful in bringing out the points of how and when to induce labor, and comparing Cesarean section and pubiotomy. The object of labor is for a woman to have a live child, and the object of the accoucheur is to deliver the woman of a live child by extracting the child from a dangerous condition or position. Our object is to deliver a woman and give her a live baby; and, furthermore, to leave her in a condition so that she can fulfil her position in society, and possibly, if she so desires, to have children again. We do not accomplish the whole of our art in helping a patient out of a condition into which she has gotten by being pregnant.

It is with great pleasure I see that we are coming back to the position where we want a woman to have a normal labor, with a normal recovery. No man can call an induced labor by any means an easy thing. There are very, very few cases where there is not more danger to the parts immediately accessible of infection and a greater danger of morbidity than with Cesarean section. Any man who has done the work knows that.

Again, if you take the cases that have been brought up to the period of labor; if we have avoided interfering with the cervix, our statistics for mother and child are far better than if we were to try in a preliminary way to dilate that cervix.

I am very glad to have heard the point brought out by Dr. Davis, and emphasized by Dr. Edgar, about the condition of the cervix, and how difficult it is to get drainage afterward. The cases I have seen, in which there was trouble from infection, could have been relieved by drainage.

As regards pubiotomy, Dr. Jewett did symphyseotomy; we followed it in the maternity, and while we obtained a live child, yet it seemed to us we had an added risk. We can go to a private patient, who calls on us to attend her, examine her pulse,

know the character of the woman, know how she is nourished, what food she can get, and how much we can restrict her diet. We can determine from a knowledge of her previous history how much she can stand in the way of pain, and that is a very important factor in our modern society people. These people will not bear pain; they want chloroform administered, and when we give it we interfere, more or less, with nature. Knowing these things, we can explain intelligently to our patient whether we should do Cesarean section, whether we should wait or interfere before labor, or let the woman go to full term and stand the chance of dilating the cervix normally by uterine contractions and ending the operation by a Cesarean section. I think in the vast majority of cases we will gradually get to the point where we will let our cases go to labor, prepared to do Cesarean section, and not interfere with high forceps or version, or with any other method that would produce traumatism of the cervix and possibly cause infection, which destroys the result that we should get from a clean Cesarean section. I have held that and advocated preliminary Cesarean section, but I believe I have seen cases do better when we got them to the time when we could get good drainage from the cervix, when the uterus would contract, and when the patient was put in the position of a woman in normal labor.

Dr. Robert L. Dickinson.—The Society is to be congratulated on having papers with such power and of such honesty.

On the question brought up by Dr. Reynolds as to the prediction of the course of labor with its bearing on elective Cesarean section, Dr. Edgar has made an important qualification—namely, that in vigorous women we sometimes fail in our prognosis entirely. Dr. Reynolds has drawn attention to a negative reason on which he laid stress, that we can often foretell a difficult labor because of chronic toxemia and because of chronic neurasthenia, and this is, surely, an important point to remember. The only Cesarean I lost was a woman who suffered from toxemia throughout her pregnancy. I operated on her at the beginning of labor pains, and she faded out from lack of resistance following an easy section.

For many years we have had control of the second stage of

labor, and with Cesarean section, with forceps and version we could do what we chose; but we have stood helpless before the difficult dilatations and before the vicious or badly developed cervix. Take a woman who has had a chronic cervical endometritis, or a gristly cervix; or who has had a supravaginal hypertrophy of the cervix, and if you try to induce labor in such a case you will often fail.

It is unobstetrical to stick a bougie in the uterus, as it may loosen the placenta. Also it may carry infection, because we cannot be sure of absolute cleanliness. A Voorhees bag or any other dilator may not induce labor, or it may dilate that section of the uterus between the contraction ring and external os, leaving a gaping antechamber, while not overcoming the ring of resistance above. Even gauze packing has its failures. The Pomeroy bag, worked out like the O'Dwyer tube by its deviser, but not published to the profession until it was practically perfected, has given us such complete control of this stage of labor that I can do no better than instance a case.

This woman with an impossible heart was allowed to go to term. Within sixty minutes Dr. Pomeroy extracted a living child without serious damage, without the brutality of the Bossi dilator, whose points we cannot control. Now, the Pomeroy bag, if anchored inside the cervix, will bring about fine dilatation in the lower portion of the birth canal; it will efface the cervix, and also shove the cervix upward. It lies above, beyond the permanent contraction ring and yet sticks out from the vulva below. Through the opening resulting, forceps can be applied or version be done.

In another case there were massive scars in the pelvis due to a previous labor. The cervix had been literally torn out to the pelvic wall by forceps, leaving nothing but scar tissue. Without major injury to these scars, a forty-minute dilatation was effected, followed by version and prompt extraction of the child. We have control of the first stage of labor. We need no longer induce labor except in those multiparæ with whom it is easy.

I will take issue with Dr. Edgar as to the matter of drainage in cases of elective Cesarean section. In my cases I have never

seen difficulty even when the cervix only admitted the finger. Drainage in these primiparæ is usually sufficient.

Dr. E. W. Cushing.—I have been very much interested in what has been said with regard to the induction of labor, and, undoubtedly, there is no need of inducing labor in a certain class of cases. Every man's experience should guide him. I do not have a large obstetrical practice, nor a large obstetrical hospital. Cases are sent to me by midwives, and I find many of the women so referred have contracted pelves. On the other hand, I have an acquaintance among physicians in the country many of whom have had patients who have had great difficulty in their previous labors; where there was disease of the heart, tuberculosis, or some other affection which made it desirable to anticipate delivery by forceps about three weeks before term, while the fetal head is a little smaller and its diameters softer. In such cases I do not believe in the method advocated by Dr. Davis, of introducing bougies for purposes of dilatation. I used to do that. I remember one case in which, after much trouble in trying to introduce a bougie to start labor, I found a double uterus, and that I had been exceedingly careful about introducing the bougie into the wrong pocket, and I gave up that method. If I had to extract a child, I would do it according to the method that has been described, with rubber gloves; and I do not find the Bossi dilator an abominable instrument. It is a beautiful instrument if you give it time, and with the modern method of giving scopolamine-morphine anesthesia, or hyoscine-morphine anesthesia, the cervix can be dilated gradually, with very little or no ether, you can take three-quarters of an hour to one hour to do it, the pains will come on fairly well, and the cervix can be dilated without trouble, and the child can be readily extracted. If there is any hemorrhage, you can squeeze the uterus against the pubic bone, as I did in one of my cases. I have seen no morbidity and no trouble of any kind except what has been referred to. If version is done, the child is likely not to do as well as one would that is delivered with a head presentation. If the child is held down in the pelvis during dilatation, forceps can be applied and the child extracted just as easily and as smoothly as if the cervix had been dilated naturally. That is the proper course to pursue. I believe

a large number of these cases can be treated in that way, and many of them do not require Cesarean section.

Dr. George Gellhorn.—It has been said that the object of labor is for a woman to have a child, and not merely for us to deliver her. I would add: the object of our efforts is to leave a woman in the best possible condition after she has borne a child. It seems to me that in elective Cesarean section this cannot always obtain. If we perform a Cesarean section from a relative or absolute indication, we take the consequence. We have to weigh the matter of whether we are entitled to subject the woman to the danger incident to this operation.

Dr. Reynolds has given us wonderful statistics from his personal experience, with no mortality. But his experience is not that of other operators. About twelve years ago I assisted Bumm in doing an elective Cesarean section, and the woman died. We have heard of other cases of death from Cesarean section today by Drs. Grandin and Dickinson. Aside from the mortality to the mother, the number of cases of spontaneous rupture of the Cesarean section wound, during the course of subsequent pregnancy, is constantly increasing. At least 12 cases have been reported within the last three years, and I am quite sure that a number of other cases of rupture of the Cesarean section wound have occurred, but have not been reported.

The same objection holds good with reference to pubiotomy or symphyseotomy.

I have under my care at present a woman upon whom I expect to operate next week. This woman has had either a pubiotomy or symphyseotomy performed on her (I cannot quite make out which), the operation having been done three years ago. At that time she had a moderately narrow pelvis. Today, on account of a callus that has not been reduced, she has a highly contracted pelvis. Moreover, she has a retroflexion of the uterus that is bound down by adhesions. She has deep cervical lacerations; she has a tear of the perineum, including the sphincter, so that, in my opinion, pubiotomy or symphyseotomy is not the operation of choice.

I have done but two craniotomies in my professional life; but in a case of moderately contracted pelvis, where many difficulties

are met with in the confinement, I should not hesitate to do a craniotomy and induce labor at the next pregnancy. I fully realize that a stigma has been placed on this operation, and that some German authors absolutely condemn it, but I think there are conditions in which we are justified in performing it. I performed this unpleasant operation a week or ten days ago. The woman had been in the hands of two physicians for twenty hours, and numerous futile attempts had been made to extract the child. I put in another hour and one-half trying to deliver the child with forceps, but finally gave it up and did a craniotomy. I believe that if we induce labor at the thirty-sixth week, so far as we can determine, by any means, by the use of hydrostatic bags, etc., we will obtain the same results that we would by any of the methods or operations that have been mentioned, but with less danger both to the mother and child.

Dr. Seth C. Gordon.—For several years I have not done very much obstetrical work, but I have had three cases of induced labor in my professional life with the best results, and I agree with Dr. Cushing that this matter is of such great importance that we should not pass it over too hastily.

The child I extracted following induced labor is now twenty-two years of age, and is the son of one of our New York millionaires. The woman had had three craniotomies performed on her. I did one, and the other two were done in New York. She came to Portland again (where her former home was) pregnant, and I determined then I would induce labor, which I did, about the thirty-sixth week. Of the three children she had given birth to by craniotomy, at the very least, each one would have weighed eleven or twelve pounds. In a case like that, with an absolutely good pelvis, but a disproportionate child and the head absolutely solid bone (so to speak) at the time the woman was operated on, there can be no question as to the induction of labor being the safest and best thing. I had no difficulty in inducing labor in either of the three cases. I estimated, as near as I possibly could, the eight calendar months and one week added, and in each case the mother and child did well.

I agree with Dr. Dickinson that the authors of these papers are all honest in their statements, and I do not hesitate to say that

they are three of the best papers we have ever had read before this Society.

I am a little disposed to disagree with Dr. Reynolds as to the elective Cesarean section. I believe the weight of testimony is in favor of waiting until the absolute time of delivery, and then at once operating. Having estimated the obstacles in the case, having fully determined that Cesarean section is the best thing to do, then at the time of the first pains begin Cesarean section. I believe Cesarean section is going to have a very much wider field than it ever has had, and that our results will be far better than any attempts at delivery of the child that have been made heretofore.

Dr. Malcolm McLean.—There is one point that has not been emphasized sufficiently in connection with this subject, and that is the period at which interference shall take place in a given labor. If my experience counts for anything, it has brought me face to face with the fact that in this rapid surgical age there is hastiness about interfering with labor cases at entirely too early a period. This predicates that there is going to be difficulty with the dilatation, and very often obstructions to the delivery of the child are supposed to be due to faulty structures, either of the bony or soft parts, faulty because they have not been allowed to go through their physiological changes. In my experience that is not a small factor. In consultation I find myself undertaking operations, even Cesarean section, in cases where delivery could probably take place normally, if allowed to continue a sufficient number of hours. Within seventy-six hours I have been called to a case where such a serious operation was proposed on account of difficulties confronting the obstetrician. The woman was a primipara. She was taken sick at one o'clock in the morning, and at nine o'clock that morning they called for a consultant to assist in delivery of the child by one of these major operations. It seems to me no further comment need be made on that case. It is a type of case which I see not infrequently, and I shall not take time to dwell on it further. Please understand me that I am not opposed to the eloquent plea that has been made for this operation, which I fully recognize; but is it not likely that danger may come to ambitious operators in obstetrics who are not

sufficiently capable of judging when that operation should be done? When it can be shown that with good, clean surgery the abdomen may be opened, the uterus opened, the child delivered, and both lives saved, that operation may be done in cases where a comfortable or comparatively normal labor could be consummated. In such cases as that it is not good obstetrics to do such an operation, and I think we should avoid it.

One of the steps I have taken to demonstrate the lack of necessity of such a procedure with general practitioners has been to have the patient placed under the influence of an anesthetic; then take the fetal head and crowd it into the superior strait, and demonstrate to them that the head can fit in there. That is done by all operators who undertake Cesarean section; it is a simple procedure, but important one, to make sure that the head by possible pressure can be brought to fit in the entrance strait.

As to the hard cervix, every obstetrician knows that certain cervices will present a cartilaginous obstacle, so to speak, to dilatation, but they will not remain so. There will come a time, say a few hours, when the cervix will soften under proper conditions. Therefore, I endorse what Dr. Grandin said a moment ago about packing the cervix and letting it go for twelve or twenty-four hours, so that it may further dilate.

I fully endorse what Dr. Dickinson has said about the hydrostatic bag of Pomeroy. I have had experience with it. Dr. Pomeroy's bag has been constructed on a different principle from that of others, and, in my judgment, is far superior to all that have gone before.

Dr. Philander A. Harris.—A few years ago I opened a correspondence with the physicians in and about Paterson, N. J., with the special object in view of collecting cases in which children were unintentionally killed by accoucheurs.

From the result of such inquiry I think I may safely say that for every child alive in utero and delivered by Cesarean section there were at least half a dozen cases of delivery in which the children were lost either by intentional or unintentional mutilation. Many of the mothers were also lost. Probably almost all of these cases were due to distortions or smallness of the birth canal. The disproportion of the fetal heads and canals

were not generally appreciated, and while craniectomy was now and then performed on living children, a larger proportion of these children were destroyed by violence in forceps delivery.

I am absolutely certain that there are thousands of children unintentionally destroyed in the violent methods of delivery, most of whom might be saved by suprapubic Cesarean section and with a far lower maternal mortality.

Dr. Willis E. Ford.—I am sorry the members of the Society take so serious a view of pubiotomy. I have been looking for a suitable case in which to do this operation for a number of years, but have not run across one. I desire, in this connection, to relate an unfortunate case of pubiotomy, in which previous attempts at delivery by forceps were undertaken. The operator turned the forceps upward and broke the pubic bone, with the extrusion of the intestines through the opening. I got there in the night. The urethra was torn off lengthwise, and lay in the bottom of the pelvis, but was not severed crosswise; it was still attached to the bladder. The perineum was gone, together with the rectum. I secured what union I could, after having put the intestines back into the abdominal cavity, by suturing the periosteum with catgut. Of course, the woman was very much exsanguinated. This woman afterward had a first-class pelvis. I do not know how much flattening she had had, but she must have had a good deal in order to have justified that unfortunate pubiotomy. However, she has borne a child since without any difficulty. I had to repair her bladder twice, which was torn lengthwise, before I could get perfect union.

It has seemed to me that pubiotomy is a legitimate surgical procedure, and I have been looking for a case so as to be able to do it in a better way than it was done on the patient I have referred to.

Dr. Reynolds.—In the first place, I want to say, in reference to what Dr. Fry has said, that I am a little surprised I was quoted by Dr. Fry as approving pubiotomy. I can see, however, why he misunderstood me. I wrote him that I believed there was probably a very narrow indication for that operation, but I went on to say in reply that, although I had done symphyseotomy, I hoped I should never have to do either that or pubi-

otomy again, and I ask Dr. Fry to take my name off the list of approval.

I have been pleased at the tone of the discussion. One of the difficulties in presenting a large subject in fifteen minutes is that one cannot put forth his views in extenso, and there has been very little said that I have not already covered in the complete paper.

I want to say in reference to the paper of Dr. Davis, that having just been through an extended study of the literature of the world for the last ten years, I think I am more in a position than most men to appreciate Dr. Davis' extraordinary success with his late cases, and his Cesarean sections after the induction of labor. His success, I think, is unparalleled by any other operator. I am glad to note the contrast between his success and that of most operators; but I still feel that Dr. Davis' series of cases is hardly large enough to eliminate the element of chance, and that in spite of the great cleanliness which he carries out in inducing labor, followed by Cesarean section, I am afraid that something like the mortality which other operators get will creep in his work.

I was much interested in Dr. Edgar's remarks, with most of which I agree heartily. When Dr. Edgar reads my paper in full he will see that the line drawn between the primary and secondary classes in my statistics is an indefinite one, and that the only just conclusion is that the mortality will vary as labor goes on.

I disagree with Dr. Edgar completely as to the advantage through dilatation of the cervix which he thinks is gained by operating in the first stage. The necessity for drainage, to which he has referred, is pure chimera in the majority of cases. I quite agree with him that there are hard, small cervices in which it would be wise to wait for dilatation, but this applies to abnormal cervices only. In my early cases I was much impressed with the necessity of drainage and usually waited for it, or when I did not wait for dilatation I inserted gauze, but I got sapremia, and by and by, when I gave up gauze altogether, the sapremia stopped. If he will give up gauze he will not have to wait for dilatation.

As regards prediction of the character of labor, the position which I take on the whole question is this: It is not easy to predict in advance the results of labor. It is a difficult matter. It is a matter on which we are today less well equipped than we shall probably be in the future. It is a matter on which no man may dogmatize; but I believe that from collective experience, as found in the literature, and from the words we have heard today, all of us are convinced that if we could only reach the ideal state, we would prefer to do a clean surgical operation before labor.

The point which I make is that if this is rendered clear by study and by subsequent observations, we have been wrong in simply lying down and saying we cannot do it. We ought to try. My own experience, after many years of careful study, has been so clear, as to its possibility, that I am perfectly content to await the verdict of time. We shall find we can already make a fairly accurate prediction of the results of labor.

I stand very clear on the other point about which so much has been said. If we have a good, strong woman, and we are in doubt as to what to do, we should not be afraid of the old-fashioned method; let her hammer away at labor until she is tired, then attempt some intrapelvic operation. It is the best thing to do for her. If we have, on the other hand, a woman who is unfitted for labor, the worst thing to do is to give her a combination of the exhaustion of labor and Cesarean section, and I do not believe it is necessary to argue to any collection of operators to show that an occasional mistake in doing such a simple operation as a primary Cesarean section unnecessarily will not lead to any increased mortality. In doubtful cases in feeble women I think it is a safer mistake to do this operation than to trust to luck in labor.

Dr. Fry.—Dr. Reynolds spoke of the desirability of having more cordial relations existing between the general practitioner and the obstetrician. I think there is room for improvement in this regard, because it is the general practitioner who first sees these cases of labor, and we are called upon frequently after the women have been in labor for some time, after they are exhausted, and ineffectual efforts have been made to deliver them.

These women should be seen early, and delivery not attempted too long before they are turned over to obstetricians.

With regard to pubiotomy, I have not placed it before you in an enthusiastic way. Some of the gentlemen whom I supposed favored it now ask that their names be withdrawn from the approval list. I will say, however, that I did not give every reason in full of each man because I could not do it in my abstract, but I quoted sufficiently to indicate the men who favored it, and it does not commit them strongly. Dr. Grandin, in his letter to me, states: "It appeals to me, however, as preferable to symphyseotomy." Dr. Reynolds preferred Cesarean section as a primary operation, but believes there is a small field for one or the other of these operations, symphyseotomy or pubiotomy, in neglected or septic cases, in which forceps has failed.

In regard to the induction of premature labor, Dr. Davis has shown that there is a fetal mortality of over 18 per cent., and I believe that the induction of premature labor is not a proper method in any flat pelvis where the conjugata vera is down to or below 9 cm. Induced labor ought not to be done before the thirty-sixth week, if we can carry the mother to that period, and especially if she has given a history of having had a very large and well-developed child, and we have a conjugata vera of not less than 9 cm., we may induce labor. If we have 1 cm. below that we are not likely to get the child out alive.

A year ago I did a symphyseotomy on a woman in whose case the conjugata vera was 7.5 cm., and delivered with forceps.

On last Saturday, one year later, the same woman entered the hospital in premature labor at the seventh month. When I saw her the body of the infant had been delivered, but the head remained at the pelvic inlet. By traction from below, aided by strong suprapubic pressure, a dead infant was extracted. Here was premature labor at the seventh month in a second pregnancy, with a fatal result to the baby.

In regard to the method Dr. Cushing described, it ought to be a surgical operation and performed just as a Cesarean section.

When Dr. Dickinson was eulogizing the use of bags for dilatation, I thought of vaginal Cesarean section. Where we have one of those cases in which the cervices are such as has been

mentioned, by Dr. Davis, in a primipara, if we are going to introduce labor and do it surgically, I believe we should do it by a vaginal Cesarean section. In the case Dr. Davis reported as having been sent to the hospital amid the best surroundings, and it took three days to deliver the woman, I should say she could have been delivered in six minutes by a vaginal Cesarean section.

Dr. Davis.—With reference to the remarks made by Dr. Fry, I will say that delivery by vaginal Cesarean section occurred to me at the time in the case mentioned, but was not permitted.

So far as Dr. Reynolds' contention goes, that we may anticipate labor by the character of pregnancy, I think the age of the patient has very much to do with it. We are told that all things are possible to the young, and certain it is we see young women, almost girls, in fact, deliver themselves in a surprising manner when they have contracted pelves, or seem to be weak and ill. It is in the older women that Dr. Reynolds' prediction can best be borne out.

So far as drainage is concerned, I will say that on three occasions I passed gauze from the uterus down through the cervix without the slightest bad effect, with absence of either sapremia or intoxication. But it is to be avoided, as a rule.

I am still strongly of the opinion that the ideal method of conducting labor is to let it begin and continue, if possible, without any interference whatsoever. I have never yet predicted what the course of labor in a given case would be, or whether it was suitable for Cesarean section or not, and never shall make that prediction unless I am absolutely forced to do so by the refusal of the patient or parents to come to the beginning of labor. So far as my knowledge goes, at the present time I decline to predict in most cases that a patient cannot be delivered by spontaneous labor. Certain it is, that spontaneous labor places the cervix in the best condition for drainage; it brings the uterine muscle in the best condition to contract at the time of the operation. Therefore, I am strongly opposed to the induction of labor if it can be avoided; at the same time, as Dr. Gordon remarked, it is perfectly feasible. I have in my practice two families of children, all induced-labor children.

In one instance the parents have three splendid children that were born by the induction of labor. In the other instance the parents have two children born by induced labor, and are perfectly satisfied with the results of the operation. Notwithstanding this, I still maintain that these children were born with greater risk to both the mothers and children than if they had been delivered by other methods.

With regard to symphyseotomy, it is an operation that can be done, but it is very inferior as a surgical procedure, and pubiotomy is worse than symphyseotomy, for the reason that it opens the pelvis at a point where hemorrhage is more likely to occur, and there is danger of laceration of the vagina to a greater extent by pubiotomy than by symphyseotomy. I cannot see much of a future for pubiotomy in the present state of surgical science.

I am fully in accord with Dr. Reynolds in his plea for elective Cesarean section, but do not believe it should be undertaken in most cases before nature has made some effort at delivery.

A SECOND SPECIMEN OF OVARIAN PREGNANCY.

By J. Clarence Webster, M.D.,
Chicago.

In May, 1904, I described a specimen of ovarian pregnancy at the meeting of the American Gynecological Society. It was presented to me by Dr. Evans, of La Crosse, Wisconsin.

I am again in a position to demonstrate another specimen which has been presented to me by Dr. Gunderson of La Crosse, Wisconsin. The following clinical record I owe to the courtesy of Dr. Gunderson:

Mrs. O. W., aged twenty-one years, entered the Lutheran Hospital, December 21, 1906. Her menstruation had been regular until September, when it did not occur. In October she flowed a little at her regular time and again two weeks later. On November 29 she lost considerable blood, and was seized with sharp pain in the pelvis. During the succeeding weeks there was a recurrence of pain from time to time. There was occasional morning nausea, but she vomited only once; there were no fainting spells. She was not confined to bed.

Physical Examination. The patient was pale and nervous. The breasts were somewhat enlarged and sensitive. The uterus was found in its normal position, not much enlarged or softened. The left ovary and both tubes could be palpated. Behind the uterus was felt a firm, rounded swelling as large as a fist. On opening the abdomen, the tumor in the pouch of Douglas was found to be developing from the

FIG. 1.—Ovarian pregnancy. External view. Right side.

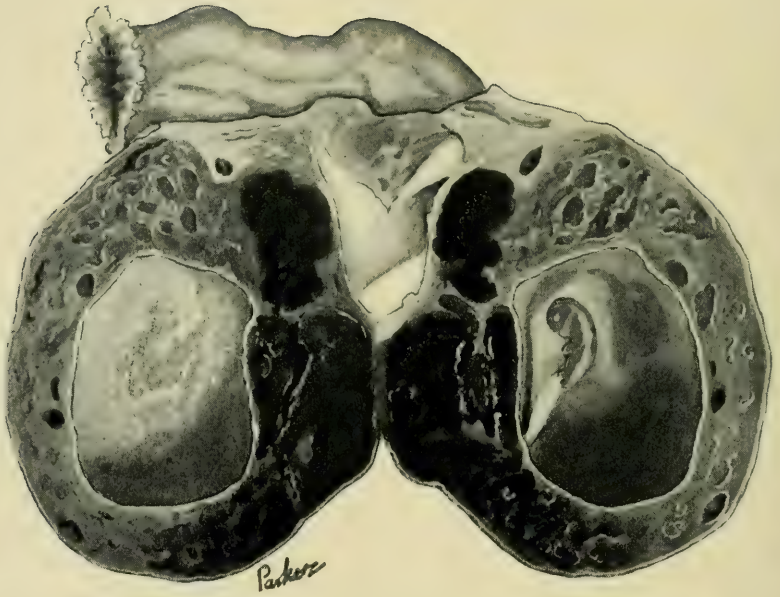

Fig. 2.—Ovarian pregnancy. Ovary is divided and opened, showing the amniotic cavity and embryo.

right ovary. It was dark in color and attached to surrounding structures by recent adhesions. There was no blood in the cavity. The tumor and the right tube were removed. As the vermiform appendix was swollen and injected, it was also removed. The abdomen was then closed. The patient made a good recovery.

Description of Specimen. The ovarian swelling is an irregularly rounded mass, measuring 8 cm. vertically, and about 7 cm. transversely. The surface is irregular, being marked by low, rounded elevations, dark in color for the most part; elsewhere the surface is dark gray. At intervals a few adhesions are found; the main area of the surface is, however, smooth. Between the mass and the right Fallopian tube the broad ligament is found. The tube is well formed, measuring 10 cm. from its divided, uterine end to the fimbriated extremity. The ovarian fimbria is in close relationship to the ovarian swelling. There is no indication of tubal abnormality. On making a vertical section of the ovarian swelling, the nature of the latter was clearly revealed.

Occupying the central portion was an irregular, ovoid cavity measuring about 3 x 4 cm., lined with amnion and containing amniotic fluid and an embryo about 2 cm. in length, attached by a short cord to the wall of the cavity. Indications of limb-buds were visible.

External to the amniotic cavity the tissue had a spongy character and was mottled with gray, yellow, pink, red-brown and dark-purple areas, and measuring from cavity to outer surface from 1 to 2 cm. In the upper portion of the specimen a thin peripheral layer, somewhat resembling the normal tissue of the ovary is found.

Microscopic Appearances. The appearances presented, on microscopic study of the specimen, are almost identical with those described in the case previously reported by me.[1] Very little normal ovarian tissue is found, being located near

[1] TRANS. AMER. GYNEC. SOC., 1904

the hilum. The great mass of tissue between the outer surface and the amniotic cavity consists of chorionic tissue, intervillous sinuses, and extravasated blood. Many of the villi are torn and are in various stages of degeneration. Many ovarian vessels are enlarged, the capillaries being distended to form large blood sinuses which communicate with the intervillous spaces; here and there large cells are found in the walls of these sinuses, but not in such large numbers as in my first specimen. A small area of decidua-like cells is found at the surface. The amnion is normal.

HERMAPHRODITISM: UTERUS AND TUBES REMOVED FROM A MALE.

By J. Clarence Webster, M.D.,
Chicago.

This specimen is a very remarkable one, and is, I believe, the only one on record in America. I am not certain that one exists in any European museum.

This specimen I obtained two years ago from Drs. White and Ferguson, of Moncton, N. B., while on a vacation there. A brief account of the clinical features of the case, from which it was obtained, is as follows:

The patient, a man, aged thirty-three years, was admitted to the Moncton Hospital with symptoms of acute peritonitis following the kick of a horse. He had had for many years an irreducible scrotal hernia on the left side, and it was supposed that strangulation or rupture had resulted from the injury. An operation was performed; an incision was made over the hernia. This was found to consist neither of omentum nor intestines, but of a mass which looked like adult uterus, tubes, and ovaries. These were removed, the uterus being divided through the cervix, which was adherent to the inguinal ring. The abdomen was then rapidly opened, but the patient was in such a bad condition that nothing could be done save to make a hurried examination. The patient died very soon; no autopsy was obtained. The specimen was given to me, and I have carefully examined it. On first presentation, it seemed like ordinary adult, female

genitalia, but on careful dissection and microscopic study, one found that while the uterus and Fallopian tubes were present, the structures which appeared to be ovaries were really testicles, being related to the broad ligaments like ovaries in the female. The mucosa of the uterus resembles that of the child rather than of the adult female. Otherwise the organ is exactly like that of the full-grown woman. It is not of the infantile type. The tubes have the characteristics of those of an adult female, except that the fimbriæ and folds of the mucosa are not so complex. Both round ligaments are present, but on the side on which the cyst exists the ligament is flattened out thin. Careful dissection of the broad ligaments discloses a tube about 4 mm. in diameter, slightly convoluted, extending from the upper, inner portion of the broad ligament toward the cervix. It is the vas deferens, derived from the Wolffian duct. This tube evidently conducted semen, because the man was the father of twin children.

I shall not say anything more in detail about the specimen, as a full account of it was published in *Surgery, Gynecology and Obstetrics*, 1906. One of the most interesting features is the size and shape of the uterus, resembling that of the adult female. When I saw the specimen and heard it was taken from a man, I said the man must have been a hermaphrodite; that there must have been ovarian structure in the man. No human female was ever yet dissected in which a uterus of that shape existed without the presence of ovaries. I believe it is impossible to have a uterus of adult type except where ovarian tissue is present.

In the notes furnished me by Drs. White and Ferguson, it was stated that when they opened the abdomen and made an exploration of the pelvis, where the broad ligaments extended, they saw another structure, which was not removed, resembling the ovary on one side, and, in all probability, that structure was ovary. There is no ovarian tissue to be found in the

specimen which I have passed around. The cervix is cut away from the back of the prostate, and represents a remarkable condition—a well-developed Müllerian tract in the male. Normally, the Müllerian tract in the male is represented by a small, sessile body in the testicle; occasionally, by a slight remnant along the middle portion of the tract, and by the prostatic uterus masculinus, which is usually only a small tube, one-half or three-quarters of an inch in length, extending from the urethra toward the posterior surface of the prostate. Very rarely has any projection been described in the back of the prostate. Professor Primrose, of Toronto, has described a specimen in which there was a small, bifid projection from the back of the prostate, continuous with the uterus masculinus, this bifid projection representing an early Müllerian-tract remnant. But here we have a very large uterus attached to the back of the prostate gland.

There are a number of other interesting points, but I shall not take time now to mention them.

DISCUSSION.

Dr. E. W. Cushing.—I wish in connection with what Dr. Webster has said to relate a case which occurred in Boston. A man had an inguinal hernia for which he was operated upon, and to the astonishment of everybody a uterus was found in the hernia. If I am rightly informed, the operator did not know what to do, and the patient was allowed to come out from under the influence of the anesthetic in order to be consulted as to what to do. With his consent the uterus was taken out. I merely mention the case, although it did not occur in my own practice, knowing Dr. Webster is interested in such specimens. This specimen can be seen in a laboratory in Boston.

Dr. Thomas S. Cullen.—We are greatly indebted to Dr. Webster for the presentation of these two interesting specimens.

Only a few cases of ovarian pregnancy have been reported, and this specimen of Dr. Webster's still more firmly establishes the fact that ovarian pregnancy may exist. We have not seen one case of true ovarian pregnancy in the Johns Hopkins Hospital since it opened.

Dr. Ruhräh, of Baltimore, several years ago reported a case which may be of interest in connection with the second specimen. The specimen was found in a male idiot three years of age, who died of pneumonia following measles. The penis is of the average size for a boy of that age, but the under part is adherent nearly as far as the external meatus. The testes are undescended; the scrotum forms a fold on either side of the penis and joins below it. There is no trace of any external vaginal opening. The uterus is perfectly formed and so are the tubes and ovaries. The specimen is one of so-called vertical hermaphroditism, of which several have been described. This case will shortly be published by Dr. Ruhräh.

I would like to detail a report of a case that came under my observation some few months ago:

O. C. J., aged seventeen years, white, was admitted to the Church Home and Infirmary, on March 15, 1907, and discharged on April 8, 1907. She entered complaining that she had never menstruated. She also said that she was suffering from double inguinal hernia. Five years ago the patient first noticed a hernia on the left side; this annoyed her considerably. About two years later a hernia appeared on the right side. The hernia on the right is larger in dimension than that on the left and at times has been as large as a "fist." It has been necessary for her to wear a truss on the right side.

Menstrual History. The patient has never menstruated, but about every month she has had hot flushes and the blood rushes to the head; she becomes very dizzy. The face becomes quite red. This sensation persists for two or three days. She has no definite headache, but her head feels "big and queer." The patient entered the hospital seeking relief for her inability to menstruate. She is a well-nourished girl, but the breasts are poorly developed for a girl of her age. Pubic hair is present, apparently in normal quantity.

On examining the patient under anesthesia we found a small opening which was the urethral orifice. This readily admitted the catheter and the bladder was at once emptied. There was absolutely no evidence of a vagina apart from a slight depression about 1 mm. in depth.

On rectal examination to the right in the pelvis we could feel a large oval mass which felt slightly cystic and was taken to be the enlarged uterus or dilated vagina. We made a transverse incision anterior to the rectum. On passing up a short distance we found that the space between the bladder and the rectum was not over 1 mm., consequently it was necessary to exercise the greatest care when separating the bladder from the rectum. Finally, we were able to sever the bladder from the rectum for a distance of five inches. We then encountered a firm mass. On palpating this mass, which at first felt somewhat cystic, it was found to be solid. We then made an abdominal incision. On opening the abdomen we encountered the fimbriated end of the right tube. This could be seen and could be followed for 1.5 cm. The remaining portion was in the hernial sac on the right side. On slitting the sac slightly and examining the extraperitoneal portion the remaining portion of the tube was detected, also the right ovary which was perfectly normal. The ovarian vessels came from the usual source. The utero-ovarian ligament passed down into the inguinal canal as did the tube. The right round ligament emerged from the canal, formed a loop on itself and reëntered the canal; in other words, both ends were in the inguinal canal.

The firm mass felt per vaginam, and thought to be due to accumulation of menstrual flow, proved to be solid. It felt like a kidney, the hilum being easily demonstrable on its inner aspect. It was about half as large again as the normal kidney should be and lay extraperitoneally, but almost completely filled the right side of the pelvis. We made an examination in the right flank and failed to find any right kidney at the normal site.

There was no trace whatever of the uterus. The bladder and rectum were the only organs in the pelvis apart from the kidney.

The left round ligament could be seen peeping out of the inguinal canal for about 5 mm. It could be pulled out, however,

much farther. It formed a loop on itself and then disappeared in the inguinal canal. In other words, both ends of the left round ligament entered the inguinal canal. The left side of the pelvis was perfectly smooth, there being no left tube or ovary and no evidence of adhesions anywhere. In the inguinal canal, however, a firm mass could be felt; this seemed to be the left ovary. The left kidney was absent.

We at once closed the abdomen. The opening below was brought together as far as possible and a small drain introduced. The patient made a perfectly satisfactory recovery.

In this case, then, we had a total absence of the vagina, a total absence of the uterus, the appendages in the hernial sac on either side, only one kidney and that situated in the pelvis.

Dr. William H. Wathen.—I wish to report a case and allow the members to decide whether it was one of ovarian pregnancy or hemorrhage from the rupture of a Graafian follicle. I gave the details of this case to Dr. Webster, to Dr. Williams, and others. The facts are briefly these: The woman weighed about 160 pounds; menstruation was always normal and regular, never delayed beyond one day except on one occasion. On this occasion menstruation was delayed two or three days beyond the normal time. The woman was suddenly seized with intense pain in the inguinal region, and when I saw her a few hours later she had a pulse of 140 to 160. She was in great shock. She was removed to the hospital, and the following morning operated on. Her pulse then was 150. The abdominal cavity was filled with clotted blood. The right adnexa was exposed and found matted, and what appeared to be a ruptured Graafian follicle. This was, because of the peculiarity of the case, purposely removed, leaving the other side entirely alone. The specimen was given to the pathologist of our hospital, who, a few days afterward, went to Philadelphia and took the specimen with him to Professor Smith to make an examination. The day that he arrived there he lost the specimen. The question I would like to have answered, if possible, is, Can it be possible for a Graafian follicle to bleed to that extent? I believe that it can; but the suddenness of the hemorrhage, the rapidity of it, and the great shock make it not entirely probable. However,

we know that in our operations sometimes when we dislodge the clot of a corpus luteum we have extensive hemorrhage. The only thing in this case, then, that would indicate that there is an ovarian pregnancy would be the fact that the woman had always menstruated regularly; had missed her period two or three days; pain was severe. The hemorrhage was quick, and in a little while she was in profound shock, with a pulse of 140 to 160, and when finally operation was done there was found to be a rupture of the ovary, with every other structure absolutely normal.

METHOD OF CLOSING LAPAROTOMY WOUNDS.

SUTURES, ADHESIVE PLASTER, CLAMPS: HOW APPLIED.

By S. C. Gordon, M.D.,
Portland, Maine.

The ideal closure of any wound is that which approximates closely each and every part of the divided surfaces, and retains them a sufficiently long time for absolute repair to be complete; and this with the least amount of any foreign material to maintain the coaptation. Laparotomy wounds are no exception to this rule. The various locations of the wounds may somewhat modify the details, but in any one there is usually a division of skin, fat, fascia, muscle, and peritoneum. Each one of these tissues demands as careful replacement as any other, in order that there may be accurate repair, and the scar tissue be free from deformity. There are several things to be attended to before any attempt is made to close the wound, and these are essential to a perfect union.

The wound should be free from any ragged or bruised tissue, and all bleeding should be absolutely checked. A blood clot may hinder repair, either by its separating healthy surfaces, thus forming a dead space, or by auto-infection or direct infection becoming the nidus of pus. Hence all injured structure should be carefully removed and all bleeding vessels ligated with small sterile catgut. If there has been any exposure of the surfaces to infection during the operation, they should be thoroughly sponged with a bichloride solution,

followed by sterile water or normal salt solution, before the introduction of sutures. It is absolutely safe to do this in any case, especially if the intestines have been manipulated much or for a long time. The hands or gloves may very easily become infected, even by this means, and the contact with the surfaces to be closed may thus impart some pus-producing germ. In the use of any solutions about the wound, care should be taken that they should be as hot as can well be borne by the operator. Early union is hastened by careful attention to small matters of this kind. In pre-aseptic times hot water was a very valuable aid in the preparation of all wounds for what was then known as "union by first intention." In wounds thus treated by hot water, until all oozing of blood and serum ceases and the parts become comparatively dry and "glazed" (as the old surgeons talked), and about to unite very promptly, much less serum collects between the united surfaces. In the selection of suture material there has been, for many years, a wide difference of opinion among surgeons. Since 1884, I have used but two kinds of sutures, catgut and silkworm gut; the latter as through-and-through sutures in laparotomy wounds, and catgut for everything else. It would be ideal surgery if we could hold the cut surfaces in absolute apposition, without the aid of any suture material at all, but inasmuch as this is impossible, the material which accomplishes the desired result with the least interference with rapid repair is what the surgeon seeks. First of all the material must be sterile; second, it should be that which is the least liable to become infected, if, by any chance, causes of infection may arise. In laparotomy wounds it must be material which will give support sufficiently long to ensure complete repair, so that danger from subsequent hernia will be avoided. Catgut alone does not fulfil all these indications. J. Collins Warren has shown by practical demonstration that absolutely complete repair does not take place in less than three weeks. If this be so it would seem advisable and pru-

dent to use a suture through the entire depth of the cut surfaces that will not absorb in less than two weeks at least. Complications, such as coughing, vomiting, distention by gas, and accidents that not infrequently occur, may strain the parts to an extent that may interfere with normal repair and scar tissue result, that will, after a time, become the seat of hernia. It is safe to assume that such a condition has come into the experience of most surgeons. Fully impressed with the importance of these things, I have for many years closed laparotomy wounds in the following manner. With a long, slightly curved needle, armed with a medium-sized silkworm gut, I introduce it from the peritoneum outward, through the entire wall, including not more than one-quarter inch of either peritoneum or skin. Each end of the silkworm gut should be carried from within outward, thus requiring a fresh needle for the second end, although, with a little care, the same needle may be threaded with the opposite end. With the utmost care that can be used, it is exceedingly difficult to sterilize absolutely the skin except upon the surface, therefore, the deeper layers may contain germs of a noxious character, which may be driven down if the needle is introduced from above. Stitch abscess is a not infrequent accident, which is probably due to this. In my own experience it has been almost unknown under this method of treatment. Silkworm-gut sutures should be placed about one inch apart. After these sutures are introduced, I use a small, strong catgut to close the muscle and fascia, usually with a continuous suture, tying once at the middle, especially if the cut be long. Before doing this I examine carefully to see that no portion of the intestine or omentum is caught by the silkworm suture, as has happened once in my own practice. By lifting up by the sutures and passing the finger under, this can be avoided.

Many surgeons close the peritoneum by a small catgut suture first, and then introduce the silkworm suture under the muscle and fascia, bringing it out through the skin. By this

means there is no danger of catching the intestine or omentum. Before tying the silkworm sutures I usually wash the wound with a weak bichloride solution, followed by sterile water or normal salt. Great care should be observed in tying the silkworm sutures not to compress the tissues, especially the skin, too much. Pressure on the sides of the wound will approximate the walls, which will relieve the tension on the sutures. If the edges of the skin are simply brought in touch a much better union will result than where the suture is drawn tight enough to depress the skin at that point. If the wound gapes between sutures, a fine catgut over-and-over suture, the entire length of the wound, completely closes the skin. With a thin abdominal wall, no intermediate sutures will be required if care is taken to straighten out the wound at the silkworm suture points. The ends of the sutures should be left long to prevent them from being encapsulated in the edges of the wound. After irrigating the surface I apply a plain gauze, maintained in place by adhesive straps, from which the covering is removed only at the point where it comes in contact with the skin. In four or five days a fresh dressing relieves the disagreeable sensation, gives an opportunity to irrigate the parts, and remove some catgut sutures. The silkworm sutures should remain two weeks unless there are signs of infection. Before cutting them the surface should be thoroughly bathed with a bichloride solution, and the suture lifted to be sure that it can be cut below the knot. Portions of a suture are sometimes left in the wound unless this precaution is taken. After removal of sutures, frequent dressings are advisable to prevent infection through the stitch holes. All pressure on the scar should be removed as soon as possible after complete union takes place. If an abdominal band is needed for general support, no more pressure should be allowed over the scar than at any other point. Direct pressure on a scar tends to hernia. All patients having an abdominal section should be kept in bed at least two weeks,

to avoid strain upon the wound, and thus prevent hernia. After three weeks it is safe to dispense with pads, bandages, etc., if primary union has taken place. The conclusions are:

1. Careful preparation of the wound before closing, removing all loose tissue, and obtaining complete arrest of hemorrhage.

2. Through-and-through silkworm sutures, the needle always introduced from within out, to avoid carrying infective germs into the deep tissues.

3. See that the omentum and coils of intestine are not caught in these sutures.

4. Close the fascia and muscles with fine catgut by over-and-over suture, tying once at the middle.

5. Use no buried suture that is non-absorbable.

6. Avoid strangulating the skin by tying the sutures too tight.

7. Allow the silkworm sutures to remain two weeks, cleansing the wound carefully before removing.

METHOD OF CLOSING THE ABDOMINAL INCISION BY SUTURE.

By C. A. Kirkley, M.D.,
Toledo, Ohio.

Perfect coaptation of peritoneum, fascia, and skin, implies that those structures have been as perfectly divided as possible, the incision straight, smooth, and from one-quarter to one-half inch shorter at the parietal surface of the abdominal wall, and made on either side of the linea alba.

Silkworm gut is used for the through-and-through and catgut for the tier sutures. The through-and-through sutures are first applied, beginning at the lower end of the incision, as near its parietal angle as possible. A straight needle two and one-half to three inches long, with three cutting edges extending toward the eye, threaded with the silkworm gut is inserted from one-eighth to one-quarter of an inch from the incised edge of the peritoneum, and, as it passes through the abdominal wall, is made to include more tissue in its centre, emerging from the skin exactly opposite the point of insertion. Another needle is now threaded with the other end of the silkworm gut and passed in like manner through the abdominal wall on the other side of the incision exactly opposite. Inserted in this way possibility of infection from the skin is avoided. As many sutures as may be necessary are inserted in like manner from one-half inch to one inch apart—the distance varying with the thickness of the abdominal wall. When the sutures are all in place the free ends are grasped with forceps which

are allowed to rest on the abdominal wall on either side of the incision.

The incised peritoneal surfaces are next brought together with a continuous catgut suture, beginning at the lower angle of the incision—and may or may not include the transversalis fascia—care being taken to evert the edges. Van Horn catgut No. 2 has proved satisfactory. On reaching the upper angle of the incision the second tier of sutures is begun at the angle of the divided sheath of the rectus muscle, ending at a point opposite the beginning of the peritoneal tier. The third tier brings together the incised edges of the superficial fascia.

The suture begins and ends with a single knot. A half-curved needle and one single thread is used. The interrupted silkworm-gut sutures are now tied, accurately coaptating the fat and skin if the sutures have been properly introduced. The sutures should be tied just tightly enough to coaptate the edges of the wound remaining open. Superficial catgut sutures may now be inserted if necessary.

The closed incision is now thickly covered with boracic acid, then with several thicknesses of iodoform gauze, then with abundance of plain, fluffy gauze. Over this is placed a thick abdominal pad of sterilized absorbent cotton, and, finally, a binder suitable to keep the dressing in place.

No attention need be given the incision until time to remove the interrupted sutures, unless there should be a rise in the temperature.

The newer methods of closing the incision by clamp, adhesive plaster, removable subcutaneous suture of silkworm gut or silver wire, etc., have hardly stood the test of time, and may often be adopted and perfect results obtained, but it would seem that a through-and-through suture gives firmer support to the incised abdominal wall than any other. While the cosmetic effect of the subcutaneous suture is very desirable in any part of the body, it is not so important in the

abdominal incision compared with the firmer support obtained the entire thickness of the abdominal wall by the through-and-through suture. The subcutaneous suture is especially contra-indicated in cases in which the abdominal wall is unusually thick.

Any method of sealing the wound is objectionable, because the wound secretion is retained. Removable subcutaneous sutures have their limitations, whatever the material, because of the inadequate support afforded, and because their removal is not always easy.

THE COMPARATIVE ADVANTAGES OF CATGUT AND SILVER-WIRE SUTURES FOR CLOSING THE FASCIA AFTER ABDOMINAL INCISIONS.

By Hunter Robb, M.D.,
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The more common suture materials are silk, catgut, and silkworm gut. No one suture material will suffice for all purposes, although silk can be made available for the majority of cases. Whatever we use, the main point is that it shall be sterile; but, unfortunately, a material that may at first sight appear to be in every way adapted for our purpose, may yet present such apparently insuperable difficulties in the way of rendering it sterile that, in the eyes of the aseptic surgeon, the risks accompanying its use may more than overbalance its other advantages. The material must also be smooth and pliable but not brittle, moderately cheap, and easily obtainable. So far as sterilization is concerned, from bacteriological experiments that we have made with a large number of materials, we would say that they would stand in the following order: (1) Silkworm gut; (2) surgeon's cable twist silk; (3) silver wire; (4) catgut, plain and chromicized. Catgut is in all probability the material that is used more than any other for sutures and ligatures, and it would be an ideal material, but, unfortunately, we have no thoroughly reliable method of rendering it absolutely sterile, without at the same time making it so weak as to unfit it for our purpose. When properly

handled, it supports the tissues for a sufficient length of time to allow of a thorough approximation of the parts, and after it has served its purpose the smaller sutures are absorbed. If, then, we could find an absolutely reliable method of sterilizing all sizes of catgut, which did not at the same time destroy its other necessary properties, we should have a ligature material of the highest value. Different specimens of catgut vary greatly, and although some of the methods of sterilization which are advocated are, perhaps, effective in the majority of instances, it not infrequently happens that a few of the inner strands are not rendered sterile, and many cases of suppuration or death, following operations, have been directly traceable to the use of catgut ligatures.

The cumol method, or some of its modifications, of sterilizing catgut must be regarded as probably the most reliable one that we have at the present time. The procedure, however, is somewhat complicated. For some years[1] now we have also been using the plain and chromicized catgut as prepared by Van Horn. On the whole we have found this satisfactory enough when the smaller sizes were used.

In using the large sizes of the chromicized gut, however, we have found that the suture sometimes does not become absorbed, but gradually works its way to the surface of the wound and is then discharged.

We have examined by cultural methods the knots and ends of catgut from wound surfaces, even when the wounds have healed by primary intention, and we have found the catgut teeming with bacteria. In some instances it would seem reasonable to suppose that these bacteria might have produced the unfavorable results that sometimes have taken

[1] Since March, 1907, we have been wrapping the glass tubes that contain the catgut in gauze, and boiling them for five minutes just before the operation. Our observations from this standpoint are too recent to draw any reliable deductions, but we feel that by this means we have gained an additional degree of security against infection.

place in the skin. I have no doubt that chromicized catgut is responsible for many of the immediate, and late superficial and deep, skin infections.

Chromicized catgut has also seemed to me to be responsible for the phlebitis that sometimes takes place in the leg in the so-called clean cases. I have met with a well-marked phlebitis, following an amputation of the cervix, in which chromicized catgut was used.

In order to obtain some idea of the comparative value of chromicized catgut and silver wire in abdominal wounds, as regards immediate or late infections, we have analyzed two series of cases, of 100 each, in which catgut was used in one and silver wire in the other, for bringing the fascia together. The peritoneum and skin in every case was brought together with plain, supposedly sterile catgut. It must be borne in mind that the catgut that was used for the skin might have had something to do with the infections that took place; but this was taken into consideration, and eliminated as far as possible. I find upon inquiry and observation that there is a wide difference among surgeons as to what constitutes an infected wound. I have also observed that when the first dressing of the wound is left to an assistant he may, in his enthusiasm, or to please his chief, almost unconsciously remove the slightest evidences of infection that may have been present. Then, again, the late infections that sometimes occur in the wound are not always brought to the attention of the chief. In this way statistics with reference to the infection of the abdominal wound are not always to be relied upon. I know, from my own experience, how difficult it is, at times, to get the assistants to put down on the records the exact condition of the wound at the first dressing. The infection that may be present may seem so slight that they think the wound should not be considered as being infected, in view of the fact that there is only a slight and temporary evidence of suppuration. My rule is to insist upon an exact description

of the condition at the first, and at subsequent dressings. Whenever there is any secretion from the wound, cover-slips are made, and culture tubes are inoculated; and if bacteria, aside from the skin coccus, are present we classify it as an infected wound. If the skin coccus alone is present, with pus, we also call it an infected wound. Unless the secretions from the wound are carefully examined, it is impossible to state that the wound has healed without any infection having been present. I am rather inclined to believe that frequently there is a mild grade of wound infection present in many cases following an abdominal operation, particularly after the so-called clean operations, in which there is a slight but persistent rise of temperature for a few days following the operation. When the skin or superficial edges of the incision are slightly separated, but without the presence of any (macroscopic) secretion, we classify these cases under "slight separation of the incision."

We have made an analysis of 100 abdominal cases in which the deep fascia was brought together with chromicized catgut; and 100 cases in which the fascia was brought together with silver wire. These operations were performed for the usual conditions that the gynecologist meets with.

In the two groups pus was found in the structures that were removed at the time of the operation as follows: seven times in the catgut, and nineteen times in the silver-wire group. In this group the incision showed suppuration in 2 cases in the catgut and 1 in the sliver-wire series. There were also 2 cases in the catgut group which showed some slight separation of the skin, and 1 in the silver-wire group, but without any evidences of suppuration in these latter cases. Consequently, in the original pus cases, with catgut, deep suppuration occurred twice in 7 cases, and with silver wire only once in 19 cases. So far as the immediate results are concerned, the incision was clean and closed in 71 of the catgut, and in 83 of the silver-wire cases. There was a slight separation of the

skin edges of the incision in 18 of the catgut, and in 9 of the silver-wire cases.

In the total number in each series of cases the incision showed evidences of infection in 9 of the catgut, and in 3 of the silver-wire cases as follows:

	Chromicized catgut.	Silver wire.
Suppuration of the skin	3	1
Suppuration in superficial fascia	3	0
Suppuration in deep fascia	2	1
Slight serous collection	1	1
Total	9	3

In the adherent cases there were no infections in the deep fascia in either group, but a slight separation of the skin in 10 of the catgut, and 7 of the silver-wire cases; and in 3 cases in the catgut, and 1 in the silver-wire there was a slight suppuration in the skin.

In the non-adherent cases there was suppuration in 3 of the catgut series, and in none of the silver-wire cases.

CONCLUSIONS.

The analysis of the various groups in which chromicized catgut and silver wire, respectively, were used shows that, so far as infection is concerned, the use of silver wire is followed by a less amount of reaction than where chromicized catgut is used, the advantages deducible from this particular series of observations favoring the use of silver wire in the proportion of about 3 to 1. We have also noticed with the chromicized catgut that when suppuration takes place the amount and extent is greater than that met with after the use of silver wire. There can be no doubt but that the immediate results from this standpoint are favorable to the use of silver wire. If, however, the results from the infection with the chromicized catgut are not followed by the occurrence of a hernia,

or a further extension of the infection to the peritoneal cavity, it cannot be said that the infection that does occur will produce any serious results in the great majority of instances.

The main objection against the use of silver wire for bringing the fascia together is that one leaves within the wound a substance that may cause the patient some discomfort, because the ends may cause annoyance by sticking into the surrounding tissues. This inconvenience, however, will not often occur if the suture is properly applied, and if the ends are turned over with a thin-jawed pair of hemostatic forceps, so that they form a ball-like end to the suture. It takes a certain amount of practice to adjust them properly, but the analysis of our case shows that we were obliged to remove only 4 sutures in over 400. Whenever such a removal becomes necessary it can easily be performed, without any inconvenience to the patient, by means of an injection of a 2 to 5 per cent. solution of cocaine in the line of incision.

So far as the frequency of hernia is concerned, following the use of chromicized catgut and silver wire, it is difficult to make any definite statements. A priori we would expect it to happen less frequently with the silver wire, as this material undoubtedly will approximate the tissues for a greater length of time than the catgut, and since, moreover, as we have found, the use of the former is less likely to be followed by suppuration of the wound.

So far as our observations go with this particular series of cases there was not a single case in which a hernia was noted. As a matter of fact a separation of the fascia and the muscle does not always take place at once, or in most instances during the first weeks following an abdominal operation; but if these cases should be carefully examined after six months or a year, I feel sure that small and, in some instances, good-sized hernial protrusions would be noticed. I have found this not so infrequently to be the case where I have had to do a secondary operation upon a patient who had been operated

upon by another surgeon; and I feel sure that the same criticism could be made in the case of some patients upon whom I have operated. Some years ago we had occasion to examine a considerable number of patients upon whom an abdominal section had been performed, and in a considerable proportion, even where suppuration had not taken place, it was possible to demonstrate a distinct separation of the fascia and muscle between the extremities of the incision. Undoubtedly, some of these areas ultimately become sufficiently enlarged to allow of a hernial bulging in the line of incision. I do not, therefore, believe that one is justified in making the statement that by using any particular sort of suture, or method of approximation, he has ensured against the development of a hernia until he has carefully examined the abdominal wound at least six months or a year after the operation.

THE USE OF LAXATIVES IN THE AFTER-TREATMENT OF LAPAROTOMY.

By Henry T. Byford, M.D.,
Chicago.

Some laparotomies are of such a simple nature that the functions of the abdominal viscera are not materially disturbed thereby, and need not be disturbed afterward by medicine. Exploratory peritoneal section, and the removal of non-adherent ovaries, are apt to be of this nature.

But the majority of laparotomies represent, or should represent, a different problem. The operation should *ordinarily* be of sufficient magnitude to justify its performance. Pathological conditions of abdominal viscera, epithelial abrasions of visceral surfaces, displacement of intestinal coils, exposure of the tissues to air, serosanguinolent effusions from sutures or abraded spots, one and all, cause more or less intestinal atony, visceral adhesion, and septic infection. For twenty-four or thirty-six hours before the operation it is usually considered advisable to relieve abdominal tension and intestinal fulness, and thus secure a favorable field for operating by a restriction of the diet and administration of laxatives. And there is no doubt but the dieting and catharsis contribute to postoperative intestinal atony, and that such atony is prolonged by the fasting that is usually necessary during the recovery from the anesthetic, as well as from the near effects of the operation.

As the result of this intestinal atony, loops of intestines

remain in contact with the injured or abraded surfaces long enough to become firmly adherent; as a result of adhesions the intestines become distended; as the result of adhesions and distention a displaced loop of intestine may become compressed, kinked, or paralyzed.

When normal peristalsis is established early, not only is this danger averted, but the intestines are relieved of much of toxic or septic matter, absorption from the peritoneal cavity is facilitated, and the patient rapidly recovers her appetite and digestive functions.

Hence, after a laparotomy of ordinary magnitude, I do not take the risk of waiting for the patient to recover her appetite and eat enough solid food to produce intestinal fulness and peristalsis, nor do I burden her disordered stomach with solid food for that purpose, but give laxatives as soon as she can take them in order to restore through-and-through peristalsis, and continue them later as necessary to secure daily evacuations of the bowels.

As to method, the intestines should be stimulated to activity by means that produce the least irritation. The plan I have found most satisfactory is as follows: 2 drams of cascara evacuant, or its equivalent, are given two hours before the operation, and 1 ounce of Hunyadi water every hour after she recovers from the anesthetic, until the bowels move and flatus is passed freely. If there is no voluntary bowel movement within twelve hours after the operation, a high enema of 3 ounces of glycerin and 3 of water is administered every two or three hours according to emergency.

If Hunyadi is not well borne I give a heaping teaspoonful of granular effervescent citrate of magnesia, or 2 ounces of the liquid citrate. I prefer salines because they can be safely continued at short intervals, for a long time, without producing any lasting, intestinal irritation. In patients who have lost considerable blood, or have not drunk freely of water before the operation, the first few doses may be absorbed and

appropriated for other than laxative purposes, but all that is necessary is to keep on with them. In such cases it is well to supply salt and water to the blood by injecting a large quantity of normal salt solution into the colon. I endeavor to forestall this postoperative water famine, however, by making free-water drinking a part of the preparatory treatment.

If flatus does not pass freely at the end of twenty-four hours, or if there is no evidence of active peristalsis, I add one ounce of spirit of turpentine to the enema and have the patient retain it as long as possible. Sometimes a high oxgall enema acts better than glycerin, and may be used either with or without the addition of turpentine.

I never regard the bowel movements, or the expulsion of gas that comes with the enema, as proof of through-and-through peristalsis, but keep on with the laxative and the enemas until flatus passes freely *between* enemas. Then I stop laxatives until the bowels stop moving, and but little flatus is expelled, when I prescribe from 2 to 3 ounces of Hunyadi, night and morning, until they are no longer required to secure daily evacuations.

Before the bowels move the patient may complain of so-called gas pains, but she finds that they are partly relieved by each enema, and, if she is told that relief will come when the laxative has worked, she is usually willing and able to endure them. They are intermittent and the oftener they come the sooner will they bring relief.

When there has been considerable trauma during the operation, with consequent soreness and an inability to endure the pains, I apply an ice-bag to the abdomen rather than give opiates. This, with an enema containing 30 grains of chloral, will usually alleviate the pain and nervousness and sometimes the nausea, without inhibiting peristalsis.

If my only object were to save life I should not bother the patient with the laxatives, unless abraded or injured tissues had been left to form adhesions; but I confess, at the risk of

being considered meddlesome, that I give laxatives in all but the simplest cases, because in those that do not really need them the bowels respond quickly, and the patient feels much better than when not so treated. Patients who had undergone a previous laparotomy generally have remarked, without being asked, that they were having a much more comfortable convalescence than after the previous one, in which they had either taken no laxatives, or had taken opiates for the pains.

ESERINE SALICYLATE AS A PROPHYLACTIC AGAINST ATONY OF THE BOWELS.

By Hiram N. Vineberg, M.D.,
New York.

Abdominal distention after a laparotomy is the symptom, par excellence, that causes the greatest discomfort to the patient and the greatest anxiety to the operator. The anxiety to the operator comes from the circumstances that at the outset he is in doubt whether the atony of the intestines be a mere temporary condition, or is the danger signal of an impending general peritonitis which he knows, in most instances, will prove fatal, do what he will or if he do nothing. Every operator knows what a source of comfort it is to him, as well as a relief to his patient, when flatus is beginning to be expelled freely through the anus. It must be admitted, however, that as one becomes more experienced in his work and improves his technique, he meets with fewer cases of alarming abdominal distention. One operator will attribute this to his care in preparing the patient by violent purging and low diet for a couple of days or a week before operation; another will attribute it to his lack of preparatory purgation; a third to his giving the patient a purgative immediately before, or right after, the operation.

In my opinion none of these factors plays a very important role. In my work I have run through the gamut of all of these, and it did not seem to me that any of them had any very marked influence in that respect. Of course, it is impor-

tant at the time of operating to have the intestines in a fairly empty condition so that they may be easier kept out of the way. Still many of my cases that have had the least distention have been the cases that I had been compelled, on account of urgency, to operate upon without giving a preparatory enema.

I think most of us have arrived at the conviction that what occurs during the operation is vastly more important regarding subsequent distention than any method of preparatory treatment, or to the administration of a purgative on the operating table, or a few hours later. The employment of rubber gloves, gentleness in manipulation, thorough aseptic suture and ligature material, warm, moist pads to protect the intestines, are, in my opinion, the factors that contribute to fewer cases of so-called ileus. Nevertheless, it must be recognized that in every abdominal section, no matter how skilful and expert the operator, or how careful and thorough the asepsis has been carried out, conditions are present that lead to more or less intestinal atony. Zuntz[12] has shown by experiments on lower animals that the narcosis of itself if continued for any length of time will be followed by marked meteorism. He has also shown that a great part of the intestinal gas is absorbed by the vessels of the bowels, and is thrown off with the expired air. He holds that disturbances of the circulation in the intestinal wall will prevent absorption of the gases, and this causes meteorism. Hence, he says, it occurs in collapse, in febrile disease, in peritonitis, and in acute chronic disturbances of the circulation of the portal system.

Kader,[13] by a series of well-conducted experiments, has demonstrated the correctness of these views. If a loop of intestines be ligated in two places only slight meteorism follows after a lapse of two or three days. But if the ligation be made to include the mesentery, or if the mesenteric vessels be alone ligated, without any constriction of the bowels, marked meteorism occurs in a few hours, causing the bowels to be enormously distended. This distention further interferes

with the blood supply of the gut. The numerous pathogenic microbes contained in the bowels can now easily penetrate the poorly nourished wall, entering the peritoneal cavity, and setting up a more or less extensive peritonitis. In this way a vicious circle is formed. It is held that any manipulation of the abdominal contents will be followed by meteorism to a greater or less degree, through a reflex action of the splanchnic nerves. We thus see that in every abdominal section there are at least two conditions—narcosis and irritation of the splanchnic nerve—that contribute to atony of the intestines. The third condition, interference with the vascular supply of the intestines, is often inevitable in gynecological surgery when one is dealing with extensively diseased adnexa.

Early in my work I had learned that when operating for a badly adherent pyosalpinx, on the left side, the case was more likely to go badly than when operating for the same condition on the right side. This I recognized to be due to the fact that in enucleating the left pyosalpinx the mesentery of the sigmoid frequently was unavoidably injured, for the mass often lay embedded in it to a greater or less extent. It has, therefore, been my custom for years, in operating for left-sided pyosalpinx, to pay particular attention to the mesentery of the sigmoid, and this attention has been rewarded by an improvement in my death rate.

So able and careful an observer as Olshausen[4] has asserted that meteorism, per se, may lead to a fatal termination.

Maragliano,[3] in a series of cases, reported 5 fatal cases after aseptic laparotomies in which, at the autopsy, not a trace of peritonitis was found. For the purpose of this communication it will be practicable to accept v. Mikulicz's[1] division of ileus into three groups: (1) Strangulation; (2) obturation ileus or mechanical obstruction; (3) paralytic ileus. Strangulation ileus is a mechanical condition caused by the tendency the peritoneum has to form adhesions after a laparotomy

has been performed. Obduration ileus has also been designated as dynamic or spastic ileus, inasmuch as the obstruction is due to a spastic contraction of the circular muscular layer of he gut which, according to Leube,[16] is caused by a partial cramp, and not by a paralysis, as had been asserted. If it occurs shortly after an abdominal section, it is generally due to an extension of the intraperitoneal inflammatory process to the intestinal wall itself.

Paralytic and postoperative ileus is the variety that concerns us most in this paper. It is the form that is said to occur to a greater or less extent after every abdominal section. According to Pankow,[2] after every opening of the peritoneal cavity, the intestines are in a condition of atony for a period lasting from three to four hours. If there has been undue roughness in handling the intestines, or if there has been undue traction on the mesentery, or if the intestines have been exposed for a long time to the air, the period of atony may be increased indefinitely. Where the atony has existed for some time, and the distention has become very marked, changes in the intestinal wall take place as has been demonstrated by Offergeld[15] in his experimental researches. This observer employed rabbits, guinea-pigs, and small dogs. After distending the intestines with air, through a tube inserted in the rectum, the animal was either killed or died if left to itself. Pieces from the various parts of the intestinal tract were excised and examined microscopically. The peritoneum was found separated from the muscular layer, and in the interspace were found fine air-bubbles and numerous rod-shaped bacteria. The two muscular layers were readily distinguishable. No evidences of edema or inflammation were present, but small ruptures were detected in them. The bloodvessels were contracted but showed no other changes. The submucous layer showed small defects. The mucosa was found altered, its stroma had undergone softening, and there was an infiltration with young red cells. The vessels of the mucosa

were markedly tortuous. Similar changes, though not to the same marked degree, were found in the lymph vessels. The epithelia themselves seemed to have lost their continuity, and here and there small ruptures were found.

These experiments confirm our clinical experiences regarding abdominal distention, and demonstrate the importance of preventive measures. How various the means and drugs are that different operators employ to accomplish this we have already touched upon. The active principle of calabar bean (eserine) is amongst the latest drugs for this purpose to which the attention of the profession has been drawn. Physostigmum or eserine had been used for many years in veterinary medicine as a remedy in colic, particularly in that occurring in the horse. In 1901 v. Noorden[9] administered this drug to the human being in a case of intestinal obstruction, and later gave it in other cases of meteorism. He published an enthusiastic report of its value in human medicine. Since the publication of v. Noorden's short paper, so much has been written on the physiological and toxic properties of eserine that we need not enter into a lengthy description of them here.

Harnak[7] and Witowsky,[8] who had made extensive researches of the properties of eserine, state that it has a stimulating effect upon the muscular coats of the intestines, increasing peristalsis and, in larger doses, causing a tetanic condition. They claim for it also a direct stimulating effect upon the heart.

Traversa,[6] by a number of well-conducted experiments, has shown that eserine acts peripherally on the motor apparatus of the intestinal canal. Its effects were observed even where the medulla, vagus, sympathetic, and celiac ganglia were excluded.

Offergeld[15] artificially distended the intestines of rabbits, guinea-pigs, and small dogs, and if the animals were left to themselves they soon died. But if eserine were given hypo-

dermically there would be a copious discharge of liquid feces, and the animals would recover rapidly. A. Oppenheim[14] made similar experiments, inflating the intestines to such an extent that the heart's action was interfered with, and death would ensue in a few minutes if the animal were left to itself. A subcutaneous injection of eserine in these conditions would seem only to hasten death, but if an anus preternaturalis were made, and the pressure upon the heart thus relieved, the administration of eserine would produce a free discharge of liquid feces through the artificial anus, and there would also occur an evacuation of feces through the natural anus. Oppenheim[14] concludes from these experiments that eserine is contra-indicated in very marked distention, with a very high position of the diaphragm. He holds that it is further contra-indicated in this condition from the action of eserine upon the unstriped muscles of the bronchi, which might lead to respiratory death. He would not consider it safe, therefore, to administer the drug when the distention is very great and has continued for some time.

K. Vogel,[5] early in 1904, made use of hypodermic injections of eserine in abdominal sections, immediately after the operation, as a prophylactic against subsequent intestinal distention. He made the claim for it also that it prevented adhesions, and cites a case in support of this view. We must confess that the case is far from conclusive. Before him Arndt[10] had employed the drug subcutaneously but not as a prophylactic, only as a remedy for the relief of meteorism following laparotomy. He asserts that he had never seen the untoward effects from its administration in marked meteorism, to which Oppenheim[14] had drawn attention. He reports a number of cases that were promptly relieved.

Pankow[2] did not obtain any good results from this drug. He quotes Professor Kionka, who states that the action of eserine lasts only three or four hours. If given right after operation, and if effectual, flatus should be expelled within

four hours. In twenty laparotomies in which he had given the drug as recommended by Vogel,[5] in only one case was flatus expelled within four hours. In another series of cases without eserine, flatus was expelled as early as in the cases in which it was given. He further criticises Vogel's results in that in addition to eserine, enemata and high injections with salt solution were employed.

It is instructive to note the experience gained in the Universität Frauenklinik of Jena where Pankow made his observations. Formerly it was the custom there to put the patients through a long preparatory treatment by free purgation and partial starvation. Alarming meteorism was very common, and some of the patients succumbed to this complication, independent of peritonitis or adhesions, an observation made also by Olshausen. For some time past the preparation of patients at this clinic has been of the simplest. The patients are allowed full diet until the evening prior to the day of the operation. Strong purgatives are never given. Each patient on the evening prior to the operation receives only an enema of soap-suds water. Only when a marked and obstinate constipation had existed, a tablespoonful of castor oil is given the day before the operation. As a consequence of this simpler method of preparation, marked meteorism is less frequently encountered after laparotomies, and at the time of operation the intestines are seldom found distended. The patient's vitality is not lowered by starvation and too violent purging. We are firmly convinced of the soundness of these views, and we have long thought that the preparatory treatment carried out as a routine in many of our hospitals was entirely too vigorous, and frequently favored just what it was supposed to prevent.

About a year ago Dr. Charles A. Elsberg, adjunct surgeon to Mount Sinai Hospital, introduced into the second surgical service of the hospital the treatment of hypodermic injections of eserine salicylate, with the initial hypodermic of morphine

in cases of abdominal sections, immediately after operation, as a prophylactic against intestinal distention. The treatment was adopted in our service in the hospital shortly afterward. It is my purpose in this paper to give an unbiased opinion as to the value of the treatment, though I confess at the outset this is not an easy matter considering the nature of the subject. In endeavoring to arrive at an opinion I had interrogated the interne staff and the head nurses, who seeing the patients at all hours are in a better position to estimate the results from such a line of treatment. I may say here that both the nurses and the members of the interne staff were very enthusiastic in favor of the drug. For a time the same head nurse, a competent woman, had charge of both gynecological services in the same ward. In our service eserine was given as indicated, in the other service it was not. The nurse was very emphatic that the patients in our service suffered very much less from the discomfort of abdominal distention after laparotomies than they did in the contemporaneous and adjoining service.

I have gone over the records of the cases of abdominal section from the time the treatment was installed until December 1, 1906, a period of about eight months. It is our custom not to give a purgative (usually calomel) until the fourth day after operation. If there is any discomfort from distention before that a low or high enema is given and repeated as often as is found necessary. Eserine was given, with the inital dose of morphine, just as the patient was coming out of the anesthetic, in 37 cases. In 15 of these cases no enema was found necessary before the day for calomel. In 1 case flatus was expelled spontaneously in thirty hours; in 4 cases an enema was given in twenty-four hours; in 3 cases in thirty hours; in 3 cases in forty-two hours; in 7 cases in forty-eight hours; in 3 cases in seventy-two hours.

During the same period there were 55 cases in which eserine was not administered with the initial hypodermic of morphine,

nor at any other time. It is fair to state that most of these were my private patients, provided for the most part with special nurses, who would be on the alert to note any discomfort on the part of the patient. Such a patient would in all likelihood receive an enema earlier than she would if she were in the public ward, where one nurse has to attend to probably six patients. Of these 55 cases 6 required no enema before the day for calomel, 6 expelled flatus spontaneously, that is, on the insertion of a rectal tube, within from twenty to thirty hours after operation. In 9 cases an enema was given in twenty-four hours, in 18 cases in forty-eight hours, and in 12 cases in seventy-two hours.

It will thus be seen that the data are in favor of the eserine treatment, as a much larger percentage of cases did not call for relief for distention by enemata. Nevertheless, I am not fully convinced in my own mind as to the value of the eserine treatment as a prophylactic against intestinal distention. For a time I would have in the ward, side by side, for the purpose of comparison, cases with eserine and cases without eserine, which were as nearly alike as it is possible to have in one's daily work. It was difficult for me to determine in these cases any difference in the distention. Of this I am fully convinced that in some cases the eserine treatment has absolutely no effect as a preventive. This applies to cases other than those in which the abdominal distention is chiefly due to an overfilled and distended stomach, and in which we would not expect any results from eserine as pointed out by Arndt.[13] On the other hand, a single dose of eserine, given right after the conclusion of the operation, does not, in my opinion, carry with it the dangers that have been drawn attention to by Offergeld[15] and Oppenheim.[14] These observers assert that eserine would be dangerous in the presence of a small, and not recognizable, injury to the intestine inflicted during the operation. The peristalsis evoked by the eserine, in such a contingency, might be attended with harmful

and even fatal results. In our service the eserine treatment was administered indiscriminately, in cases of badly diseased adnexa with extensive intestinal adhesions, as well as cases without adhesions. I am not cognizant of a single instance in which any harm came from the treatment. We can, however, see that harm might ensue if the drug were given in cases where meteorism was already present, and if it were due to a mechanical obstruction or to a localized or general peritonitis. In Offergeld's[15] experiments on the lower animals the administration of eserine in mechanical obstruction caused rupture of the intestine. When he gave it in artificially produced peritonitis there would often follow a discharge of flatus and liquid stool, but the animal would die sooner than if eserine had not been given.

To sum up, the eserine treatment given as a prophylactic, as outlined in this paper, seems to be free from danger and is worthy of an extended trial. Thus far the evidences are in favor of its being of some value. It would seem to be of especial value to counteract the probable paralyzing effect upon the intestine by the morphine which most patients need during the first few hours after a laparotomy.

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AFTER-TREATMENT OF ABDOMINAL SECTIONS.

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Although the after-treatment of abdominal sections is important, the writer is rather inclined to agree with some one who said several years ago that the fate of the patient is sealed with the closing of the wound and her removal from the table. This is even more true now than it was ten years ago, for, owing to the better preparation of the patient and the Trendelenburg posture, combined with greater speed in operating, the after-treatment in the majority of cases gives us very little anxiety. Twenty years ago the intestines were exposed on the abdomen for an hour or more, during all of which time they were not only handled a good deal, but they were alternately heated and cooled by evaporating lotions in the form of towels wrung out of hot water. Now the much better preparation of the intestines by the nurses before the operation and the Trendelenburg posture allow them to drop out of sight under the diaphragm, so that in the majority of even the most serious cases we hardly see them, much less take them out of the abdominal cavity. This of course means much less distention, which is largely due to intestinal paresis; but this latter condition has also been greatly lessened by the use of strychnine for a few days before and after the operation.

There is another reason why the after-treatment gives us much less anxiety now than formerly, namely, the earlier diagnosticating and operating, by which whole classes of

cases require shorter and easier operations and consequently make smoother and speedier recoveries.

Notwithstanding these and many other reasons for the need of less after-treatment, we still have cases now and then in which the after-treatment plays a very important role, and it simplifies matters very much to crystallize our experiences into a set of rules which our nurses can carry out as a matter of course. This the writer has done at the various hospitals at which he operates, and although the house surgeon and head nurse have authority to use their judgment in varying the after-treatment a little, this they seldom have occasion to do.

The management of the stomach is as follows: Nothing whatever is allowed to enter it during the first twenty-four hours. If the retching is very severe, and nothing comes up, we sometimes give the patient two or three tumblers of hot water with a few soda-mint tablets dissolved in them, for the purpose of washing out the stomach. When this has been brought up the vomiting generally stops. Whether it does or not no more water is given until the end of twenty-four hours. The intolerable thirst which patients used to suffer no longer troubles them, for here again it has been forestalled by giving them copious draughts of water the day before. Besides there is less indiscriminate purging with Epsom salt, from which I have seen at least one patient die in the old days. Then, again, most of our operations, even hysterectomies, are practically bloodless, the Trendelenburg position enabling us to see what we are doing so that we tie or clamp everything before we cut it. This has contributed to diminish thirst. When we have a bad case, where there has been much hemorrhage, we put 2 or 3 quarts of normal salt solution into the peritoneal cavity, which is absorbed and satisfies thirst as well as if taken by the mouth. Most operators also prevent thirst by salt-solution enemas, a cupful or 8 ounces every four hours. By raising the foot of the bed and also by giving them

very slowly, the fountain syringe being hung only a few inches higher than the rectum, it is more likely to be retained. If the rectum is too irritable to tolerate it, and the pulse is weak, and it is really important that it should be retained, we can quiet the rectum by injecting into it 5 or 10 drops of laudanum mixed in an ounce of cooked starch.

If the vomiting is very troublesome we have three other simple means of arresting it. First, we may put a towel wrung out of ice-water, and folded over and over until it is about four by six inches in size, on the throat, and change it every quarter of an hour or oftener. Second, we may try a mustard plaster at the pit of the stomach. But what I have found the best of all is our mist. rhei et sodæ, which contains 10 drops of spirit of chloroform to the dose. We begin with one teaspoonful every two hours, and, although the first few may be rejected, a little will remain down and soothe the stomach for the next, and before long we can give one tablespoonful three times a day, which will neutralize the acidity of the secretions, and clean the tongue more quickly than anything else, except calomel, of which we generally give $\frac{1}{16}$ grain every hour.

For those who have an especial repugnance to rhubarb and soda, Vichy water is a good substitute, and is greatly relished by the patients. We must take care, however, to allow most of the gas to escape first, and not to give it too cold. The second twenty-four hours the patients can have hot water ad libitum; if they dislike plain hot water it may be flavored with extract of beef, or tea, or lemon, or sugar. Of course, there is no nourishment in any form of beef tea, at best it is a mild stimulant but not to be relied upon. By the end of the second twenty-four hours the nausea is over, patients are no longer thirsty, but they begin to be hungry. I have found water-gruel, salted, sweetened, and flavored with nutmeg, cinnamon, lemon, or vanilla, to be the best diet for the third day. But it is of great importance not to make it with milk;

in fact, we take great pains to impress upon our nurses that no milk must be given during the first week. Even in the tea we give a little cream. Why? Because distention is one of our greatest bugbears and milk ferments more quickly than anything else. By the end of the third day a different kind of porridge for each day in the week may be begun, and all kinds of farinaceous puddings. By the end of the fourth day we allow, in addition, unlimited quantities of toast and bread and butter; and by the end of the first week she is having everything except meat. By the end of the second week she is having full diet.

The Care of the Bowels. The after-treatment of the bowels requires careful attention. The more trouble the nurse has taken in preparing them before the operation, the less trouble they will give afterward.

In justice to both patient and nurse the doctor should insist upon the patient being in bed in the hospital at least forty-eight hours before the time fixed for the operation, except, of course, in emergency cases. If this is done, the nurse can have the intestines so empty of food and gas, that when the incision is made and air rushes in, they disappear under the diaphragm, and, after a flat gauze-pad has been placed over them, they are not seen again during the rest of the operation. In such a case the bowels will require very little after-treatment. As there will be nothing in them for the first few days, there will be no need of purgatives. A soap-suds enema every morning will bring away a little gas and make the patient feel more comfortable.

In many cases, thanks to $\frac{1}{30}$ grain of strychnine, three times a day, before and after the operation, the gas will be expelled without any help, although in others a rectal tube left in for a few hours is necessary. Another thing which has made the after-treatment of the bowels much easier is the withholding of large quantities of morphine. Now we give $\frac{1}{4}$ grain immediately after operation, or as soon as she wakes up, and another

late that night, and that is usually all that will be required. Even these two small doses are enough to coat the tongue and cause a little distention and pain, but the rhubarb and soda mixture, which contains calumba and cardamom, soon remedies that. If the patient receives $\frac{1}{2}$ grain of morphine three or four times she is almost sure to have distention pain. In fact, patients used to suffer more pain from the morphine than they did from the operation. After the bowels have something in them to work upon, we give the patient 1 or 2 compound cathartic pills every night, beginning about the fifth night. The same objection does not apply to cream as to milk, so that we may allow a little cream in the tea, coffee, porridge, and farinaceous puddings, and with fruit.

Position. The most comfortable position after a laparotomy is on the side, with the knees drawn up almost to the chin. This takes the tension completely off the abdominal muscles and off the stitches uniting them. If the patient prefers to lie upon the back the shoulders should be raised on pillows, and the knees supported on a knee-rest which is better than pillows. In case of great loss of blood, as after ruptured tubal pregnancy, we may have to lower the head and raise the foot of the bed in order to keep the brain supplied with blood; but in all cases it is better to have the head of the bed raised so that any oozing lymph or blood may gravitate toward the pelvis, where there is more likelihood of its being encysted or absorbed, or where it can be evacuated by a vaginal incision into Douglas' cul-de-sac. In all serious cases, where, for instance, there has been a resection of the bowel, or suturing of holes in the intestine, or in bad pus-tube or appendicitis cases, it is well to put a perforated rubber tube from the bottom of the abdominal incision down to Douglas' cul-de-sac and out through the vagina. The writer feels confident that he has saved several desperate cases by doing this and keeping the patient in the Fowler or elevated position. It is astonishing what quantities of foul-smelling pus have

come away in spite of frequent washing out with peroxide solution; moreover, the upper zone of the peritoneum absorbs septic material conveying it to the lungs so that Fowler's position avoids septic pleuropneumonia.

Rest in Bed. Our practice in this respect has settled down to keeping section cases in bed for three weeks. On the nineteenth, twentieth, and twenty-first day they sit up more and more in bed, and at the end of three weeks they sit on a chair and take short walks. These walks extend more and more, including going up and down stairs, and, at the end of four weeks, they go home. Many cases feel well enough and are well enough to get up four or five days after a section, but they are not allowed; while others are still very sick two weeks later. Yet so quickly do these latter catch up with the former that by the end of three weeks they feel like getting up, and do so. A few cases closed with through-and-through silkworm gut having learned that their children were sick, or that their husband was misbehaving, have gone out in ten days, but they did so on their own responsibility; and strange to say were no worse, so that perhaps we have been erring a little on the safe side. But there are the unsuspected dangers of embolism which sometimes happen and we feel it safer to keep them in bed three weeks.

THE ABDOMINAL INCISION, PREPARATION OF PATIENT, THE CARE OF THE WOUND AND AFTER-TREATMENT, INCLUDING AN OLD PAPER ON VENTRAL HERNIA CAUSED BY LAPAROTOMY.

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Preparation of patients should be made with care and where it is practicable, before opening the abdomen, the bowels should be emptied more or less completely, and even if only a short time can be safely allowed, the stomach should be emptied by a Seidlitz powder or, if necessary, by a stomach pump. Where time permits, it is important not only to efficiently empty the intestinal tract of all fecal matter, but to give oil and glycerin *for several days* to effectually secure an empty gall-bladder.

By carefully examining all cases when the abdominal opening has been made large enough to permit it, for many years past I have found that a full and tense gall-bladder was almost certain to be followed by prolonged and active vomiting, and that vomiting rarely occurs when the gall-bladder is found flaccid or empty.

A simple milk diet should be given for several days preceding an important operation when the intestines are likely to be opened, resected, etc.

Such preparation is essential to get the best results in abdominal wounds and make sure of preventing defects in

the homologous union of the edges of the abdominal wound, and effectually prevent herniæ. Complications likely to cause coughing should be eliminated as far as it is practicable before operating.

I will quote almost all of a paper of mine printed in the *American Journal of Obstetrics and Diseases of Women and Children*, January, 1887, vol. xix, on "Ventral Hernia Caused by Laparotomy." Since then, although fully twenty years have passed, this old paper rather concisely states my views and practices of today, and I will have very little to add in the way of revision.

In my paper on "Ventral Hernia Caused by Laparotomy" (printed in italics) I wrote:

"In a paper read before the New York Academy of Medicine, January, 1885, on 'Diseases of the Fallopian Tubes,' and published in the 'Medical Record' of January 24, when describing the operation, I said: 'In introducing the sutures in the abdominal wall, I am careful to secure not only perfect coaptation of the peritoneal coats, but also of the deep and thick abdominal fascia; for, if good union of this is secured, the risk of ventral hernia is very much lessened, because it is this tissue, and not the muscles, which are longitudinal, that gives strength to the abdominal wall of the median line. In 67 laparotomies done in the year 1886, 8 were for ventral hernia, 6 women being operated upon, 2 of these requiring a second operation. In 5 of the 6 cases the herniæ were the result of laparotomies; in all of these, drainage tubes had been used; 3 of the 5 were laparotomies that I myself had done, and I know of 2 others occurring after my operations.'

"This experience has led me to make more or less a study of this subject. Except an incidental reference to herniæ after laparotomies occurring here and there, and a short account by Hegar and Kaltenbach, there is literally nothing that I can find on the subject in medical literature.

"Dr. T. G. Thomas, in the last edition of his book on 'Diseases of Women,' p. 755, under the head of 'After-treatment in Ovariotomy,' says:

"'The patient should be cautioned against rising too early after convalescence. Even after she is able to go about, she should be very careful not to make any violent efforts, and for a year or two she should wear a well-fitting abdominal corset to guard against ventral hernia. I have had this occur in several cases. The abdominal walls were separated over a space measuring about four inches, and the intestines were supported only by skin, areolar tissue, and peritoneum. In 1 case these yielded to pressure, and one year after ovariotomy a tumor about the size of a kidney, with a mass of attached omentum, escaped. The occurrence of ventral hernia is not the result of any bad management on the part of the operator. It may occur in any case, and sometimes comes on when no operation has been performed.'"

This statement of Dr. Thomas was what he and others practised, and quoted by me at the time, to contrast with my own conclusions after three years' experience.

"In large ovarian tumors the walls are frequently thinned out by pressure, and now and then an umbilical hernia already exists before the operation; but even in these cases, hernia after laparotomy can almost always be prevented by a proper operation; and, as a rule, when hernia after laparotomy does occur, it is due to the fault of the operator rather than to want of care on the patient's part after she is allowed to get up. It is not the age of the scar that gives strength, but the exact apposition of the divided tissues. A few weeks is all that is needed for the healing of such a wound, and years of time will add but little strength to imperfectly adjusted and badly united edges. It may take time for the intra-abdominal pressure to stretch the scar apart and form a hernia; and I think much of the faulty scar, especially that formed by the lymph around a drainage

tube or a stump clamped in the abdominal walls, is absorbed by time, and thus makes the starting point for a hernia to wedge itself out in spite of the best bandages.

"Hegar and Kaltenbach, 'Operative Gynecology,' 1881, writing of the sequelæ after ovariotomy, p. 297, speak of hernia after laparotomy as occurring especially among the lower classes, and recommend Simon's method of operating for ventral hernia."

Cause and Prevention of Hernia after Laparotomy. *"To speak of the causes would be to indicate the prevention. Failure to secure perfect apposition of the edges of the abdominal wound is, without doubt, a very common cause of hernia. The necessity for bringing together the edges of the peritoneum seems to be very generally recognized, but most operators entirely overlook the fact that the deep fascia which divides and forms the sheath of the recti muscles, and unites in the median line to form the linea alba, is in reality pushed aside by a wedging or separating transverse force; as a rule, this thick fascia is cut over the edges of one of the recti, and not in the centre of the linea alba. If it is cut longitudinally over, say the right rectus, the fascia retracts to that side and the muscle rolls out. When the wound is closed, unless the retracted fascia is caught by forceps and pulled up over the protruding muscle, and thus brought into apposition with the other side, the muscle or adipose tissue will separate the edges of the fascia and leave a weak spot in the wound. After a time, when the induration caused by exuded lymph has softened, or the new connective tissue atrophied and absorbed, a hernia will begin."*

Up to this time, 1887, most of our abdominal operations were confined to a median incision between the umbilicus and the pubic bone; but even at this early date I had made openings above the umbilicus, and found that much of the strength of the abdomen lay in the peritoneum or the strong fasciæ joining it, or lying just over the peritoneum; and unless this

tissue was homologously coapted and held together for ten days or more, faulty union would be pretty sure to result. That in the region above the umbilical line herniæ were not very common even if faulty union existed, compared with defective wounds below the umbilicus. That above the umbilicus the peritoneum was not so loosely attached and elastic as it is below. Lately I have seen some cases with herniæ above and lateral to the umbilicus, which resulted in very obscure and troublesome hernia, where there had been faulty apposition and imperfect union of the combined fasciæ and peritoneum. The sac escaping through the opening in the fascia formed a pouch between it and the overlying muscle, and was flattened out by pressure so that the hernia could not readily be recognized until exposed by an incision. Therefore, it is very important to secure homologous apposition and union by inserting fine silk or a suture that will ensure good union of the fascia, together with the peritoneum when the incision is above the umbilicus.

"*After the removal of a large tumor that has for some time stretched and thinned the abdominal walls, there is usually very little tension, and it is much easier to secure perfect apposition; but when the tumors are small and the patient fat, the intra-abdominal pressure is often great and the retraction of the fascia extreme. To secure good apposition, I always have my assistant ready with forceps to pull up the retracted edges as I am putting in the sutures; and when the intra-abdominal tension is excessive, I often sew the edges of the fasciæ together with separate sutures, or a continuous suture, after I have inserted the deeper ones; of course, tying the latter as I proceed, so as to avoid the chance of catching a loop of the intestine with my deep sutures.*

"*Where it is possible, I make an effort to have the omentum down over the intestines in contact with the wound; for, in many cases, the line of incision, where the peritoneum has been*

divided, becomes adherent to the tissue beneath, and I think hernia would be less likely with an adherent omentum than intestine. As a rule, the longer the incision the greater the risk of hernia, and I think I have noticed that the lower the incision the greater the chance of hernia."

Drainage Tubes. *"The drainage tube, being a foreign body, is very soon completely surrounded by plastic lymph, and in from twelve to twenty-four hours is entirely shut off from the peritoneal cavity. The lower end may be free in fluid at the bottom of the pelvis; but, unless suppuration takes place or the peritoneum is disturbed by attempts at irrigation, the discharge ceases, the fluid in the tube gets relatively clear, and the tube should then be removed.*

"It is now a recognized fact that attempts to irrigate the peritoneum are not only useless, but often hurtful, and large tubes to facilitate irrigation are no longer needed. With rare exceptions a drainage tube that is not uselessly disturbed, and only emptied by a gentle suction as the fluid rises in it, is useless after twenty-four or forty-eight hours. As a rule, a small drainage tube of glass with perforations for an inch or more at the end, the caliber or lumen about the size of a large lead-pencil, is sufficient to drain off bloody serum or water left after washing out the peritoneum. Where a drainage tube is needed, I always wash out the peritoneum freely. If a large tube is used, as the lymph which fills up the space is gradually absorbed an opening is left for the beginning of a hernia. By using a small tube and bringing the edges, not only of the peritoneum, but the fasciæ, firmly around the tube, the risk of hernia is very much lessened.

"In exceptional cases, after the removal of large adherent tumors, bloody serum will escape or can be drawn out of the tube for several days, and as long as there is drainage the tube should be left in, and every few hours emptied by means of a clean suction syringe. A weak antiseptic solution may be used to clean the tube, but never forcibly injected. In those cases

where the tube does not become encysted it is because the patient's want of strength or condition of her blood prevents the formation of the plastic exudation.

"*When the sac of a partially removed growth is sewed into the edges of the abdominal wound, or a large stump is clamped or held outside, the tissues plug up the opening very effectually for a time, but after a few months they atrophy and absorb so as to leave a ring or hole covered with scarred skin, through which a troublesome hernia may gradually force itself out. We must make greater efforts to complete the removal of all the sac of adherent tumors and endeavor to learn and practice an intraperitoneal method of treating the stump of hysterectomy as successfully as we can do by the extraperitoneal method.*

"*Mural abscess along the line of incisions may cause a separation of the edges of the fasciæ and thus increase the tendency to the formation of hernia.*"

Adipose Tissue. "*Rapid increase of the adipose tissue within the abdomen undoubtedly greatly increases the chances of hernia through any weak point along the line of incision. It is sometimes best to reduce the adipose tissue by a strict diet, both before and after the operation.*"

Sutures. "*If tied too tight they will cause unnecessary pain and may cut into the tissues. If small-sized thread is used, the number of stitches should be greater. The kind of suture matters very little, provided they are aseptic and kept so by a suitable dressing until removed.*"

Soon after writing the above about sutures I found is mattered much what kind of a suture was used, so far as preventing hernia was concerned, for we soon discovered that catgut was not reliable when used in the deep tendinous fascia, as it absorbs or softens too soon to ensure good union, especially in those cases that vomited any time during the first week, etc., and that even when treated with chromic acid it was uncertain, and often stiff and irritating. After many trials

I returned to interrupted sutures of fine strong silk as the best material for putting in the separate line of buried sutures in the deep fascia in the *median-line incision*. I rarely use the continuous suture in the deep fascia today, putting in the interrupted suture so as to lessen the chance of septic infection being confined under this strong fascia, as may be done when the continuous suture is used. Fine silver wire is not so good, for it is not pliable nor adaptable enough. For many years I have used drainage through the vaginal vault to drain the peritoneum in women, and when drainage is needed above, as in some rare cases of suppurative appendicitis, or above this or in gall-bladder cases, I use gauze drainage shaped like a triangle or cone, the centre pieces being first removed and all removed in a short time, only keeping open the fascia and skin until the wound is clean.

"*In most cases, if it were not for disturbing the healing of the abdominal wound, the patient might sit up in five or six days and walk about in two weeks. It is better to err on the safe side and keep the patient recumbent for about three weeks, but I do not insist upon the patient keeping on her back if she is more comfortable on her side. I have seen no harm from allowing them to lie as they wished. As a rule, for twenty-four to forty-eight hours they are more comfortable on their backs, with a pillow under the knees so as to flex them in that position, allowing only slight lateral change of position until the tube is removed.*"

I have not joined with those who advocate getting patients up and out of bed in one, two, or even five or six days after an abdominal operation, for I cannot see any special advantage in it, and I am sure there is some risk in increasing the likelihood of preventing a good result in securing homologous and complete union especially of the whole fibrous and tendinous fascia that make up the transverse strength of the abdomen, for we know that next to bone this tendinous tissue takes

about the longest time to firmly unite and withstand the tension, almost sure to follow the necessary muscular action of the transverse abdominal muscle that must be brought into action by rising from a recumbent position, etc., for the lower and the upper tendinous sheath of the recti muscles which unite to form the linea alba serves as the transverse tendon of these abdominal muscles. For the same reason, for at least several days, my patients, after any large abdominal incisions, are turned in bed by the nurse, on a draw sheet, and all movements of the bowels are made easy by oil enemas when indicated, to prevent straining, etc.

Besides this I prepare all my cases except emergency cases, so that a rest in bed for at least two weeks does no special harm and in many cases this rest is an advantage, not only to give rest to the severed tissue, but to save the strength and more quickly regain their general health, which in many cases needing an abdominal operation has been seriously affected.

TYMPANITES. "*Following the orthodox ideas about keeping the bowels quiet during peritonitis, until very recently opium has been freely given, and the bowels left undisturbed for at least five or six days, no matter how much tympanites and vomiting there might be. I do not yet go as far as one laparotomist in saying that a brisk purgative will stop peritonitis or sepsis, but from experience I am certain that it is not only safe to give turpentine or ox-gall enema for tympanites, after twenty-four or forty-eight hours, but that an early movement of the bowels will, when indicated, relieve abdominal distention from tympanites and stop vomiting, and thus greatly lessen the chance of the abdominal wound being disturbed in many cases.*"

To wash out the stomach and prevent vomiting after ether when one has not time to properly prepare a case for operating I know of nothing better than to give a Seidlitz powder; this

will cause free vomiting in case of a distended stomach, or it will carry the contents down in a very short time, and practically wash out the stomach with much less disturbance than the use of a stomach pump. It has been my practice for many years to order half or a whole Seidlitz powder in all cases of vomiting becoming very troublesome, or if it is prolonged after an operation, and if the first one is rejected, in fifteen minutes another is given.

For tympanites occurring after an abdominal operation, after twenty-four hours, I give a tablespoonful of spirit of turpentine mixed with ten ounces of hot soap-suds as an enema, and later follow this with a Seidlitz powder if indicated until a free evacuation is secured.

"*Not only are these symptoms relieved, but from some late experience with intestinal obstruction I am satisfied that some cases which are supposed to be peritonitis (especially those mysterious cases with very little temperature) are in reality not infrequently cases of intestinal obstruction, and most of these may be prevented or relieved by forcing an early movement of the bowels. I believe that intestinal obstruction very frequently complicates peritonitis after laparotomies, and unless relieved by moving the bowels it keeps up the vomiting and may kill the patient. Early movements after laparotomy not only prevent intestinal obstruction, but they enable us to avoid constipation and straining of the abdominal muscles, which is sure to occur if the bowels are left constipated for several days. Laxatives and enemas should always be used to obviate straining the abdominal muscles, and thus causing a separation of the edges of the fascia, which acts as a ligament to the transverse muscles. Constant or violent coughing may cause separation of the edges of the fasciæ, especially after the sutures are removed. In one of my cases in whom a hernia developed, the patient had an irritating cough, commencing on the fourth day and continuing more or less for a week.*

"It is essential if possible to control coughing, especially before and just after the time of removal of the sutures.

"Supporting bandages or trusses, unless they fit exactly, are apt to do more harm than good, by compressing the upper part of the abdomen about the waist, and thus increasing the abdominal tension below. When the patient is ready to go about, I instruct her to leave off corsets and all abdominal pressure, to avoid lifting, etc.; but unless there are indications of hernia I do not order a supporting bandage or truss. Wearing bandages after six weeks will not prevent herniæ from forming after the bandage is removed, for most herniæ occur from absorption of new tissue in cases where there has not been perfect union, or where a drainage tube or stump has left a space between the fasciæ. Therefore, a bandage must be worn indefinitely to prevent hernia, if it prevents it at all.

"When the herniæ are small, they certainly can often be kept small, and the patient comfortable, by the continuous use of a bandage or truss. It is in such cases that I order them, but in many cases the hernia will increase in spite of any bandage. Adhesive straps may keep the edges of the skin together, but they have little influence on the fasciæ."

OPERATION FOR HERNIA. *"After opening the sac, separating the adherent omentum or intestines, and returning them to the peritoneal cavity, I carefully dissect out the peritoneum and the deep abdominal fasciæ. Then I cut away the superfluous peritoneum and skin; next I place a number of deep sutures of silver wire or strong silk, including skin, fat, fascia, and peritoneum; then I bring into apposition the edges of the deep fascia with one set of sutures of catgut or small silk, and as I tie the deep sutures, if indicated, I may put in a second set, and bring together a broader surface than the mere edges of the fasciæ; in other words, if the edges are thin, I may sew the fasciæ with Lembert sutures. In this way I have got good union, after having failed in a former operation done by the ordinary sutures. The edges of the fasciæ may be retracted an*

inch or more from the median line, and it is very tedious work to dissect them out and get them into good apposition. In those cases complicated by old sinuses, care should be taken to destroy or remove all of the old pyogenic sac, and to remove the nucleus of this sac, which is usually the thread with which the pedicle of the original operation was tied.

"Before 1887 Hegar and other German operators seem to have adopted Simon's method of operating for ventral hernia, which is done by denuding an elliptical band of skin on either side and bringing it together over the reduced hernia. They endeavor to make a skin bandage over the hernia. This might answer temporarily, but could not be relied upon to last long."

The Incision. If the incision is in the median line, I make it directly over the linea alba so as to avoid injuring the recti muscles. All my abdominal incisions are made through the skin, fat, fascia, and muscles long enough to enable me to manipulate and not macerate the fat and muscles and stain with blood the edges of the cut tissues and make it difficult to see them clearly, so as to secure homologous apposition of the edges of the fasciæ covering the muscles and also the thin edges of the fasciæ between the layers of fat; the latter I often sew up with fine catgut. The opening in the skin and fat is a little longer than that in the deep fascia and the opening through the peritoneum is evenly cut, not torn, and is a little shorter than that of the deep fascia. Small openings were once considered essential, but this was before sepsis was practically eliminated. Today one often sees prominent operators, working through very small openings, bruising and now and then tearing or stretching the opening, and sewing up hastily, regardless of getting homologous apposition, and others cutting openings in the abdominal cavity big enough for the whole hand, when two fingers or a little more would be sufficient.

Care should be taken to avoid separating the different

layers of the edges of the wound by a rough manipulation, and use of retractors, leaving pockets between the fascia and muscles or the fascia and peritoneum which may fill with blood or serum and delay union and make sepsis more likely to follow.

AFTER-TREATMENT. A simple aseptic, practically dry absorbent dressing is used, and held in place by adhesive plaster strips and a binder, more to retain the dressings in place rather than to prevent separation of the deep fasciæ, for adhesive straps rarely hold together anything more than the edges of the skin.

Except in old people and those made restless from severe pain, no anodyne is given, and after ten or twelve hours no morphine nor any anodyne at all is given that would effect peristalsis. When there is sufficient pain to justify it, ten to fifteen minims of deodorized tincture of opium is given by rectum and repeated if necessary in four or five hours during the first twelve hours only.

If vomiting is severe or prolonged from the effects of ether a Seidlitz powder is given to empty the stomach.

The lips or mouth may be moistened or washed out with hot water, but nothing, as a rule, is given until the next day, and then, if there are no signs of nausea, small quantities of water are given every hour as indicated, until all thirst is allayed, the amount being gradually increased; and if after several hours there is no nausea, simple preparations of milk, partially digested or diluted, are allowed at two- or three-hour intervals. If there is restlessness or great thirst soon after the operation, simple normal saline solution is given by rectum until the thirst is relieved.

For tympanites or painful peristalsis and distention, turpentine enemas are given, half an ounce of turpentine to ten ounces of soapsuds, and if necessary a Seidlitz powder to move the bowels. Occasionally small doses of calomel, not over six-tenths, are given when indicated, to lessen dis-

tention, to be followed by a saline laxative, etc. The second or third night after an operation a mild but efficient laxative, such as compound licorice powder, is given at bedtime, and if necessary is followed by a Seidlitz powder next morning, and usually an enema to prevent straining at stool.

After the bowels have been well moved on the fourth or fifth day, simple semisolid and solid plain food is allowed, and after one week ordinary plain diet is freely allowed. The wound is examined on the fourth or fifth day or when the patient has local pain and fever. On the seventh day the silk or silver sustaining sutures are removed.

If the operation has been well done and the sutures not tied too tightly, it is surprising how many cases go on to recovery with little pain and require no medicine except a simple laxative.

HOW LONG MUST PATIENTS OBSERVE ABSOLUTE REST IN BED AFTER ABDOMINAL OPERATIONS?

By H. J. Boldt, M.D.,
New York.

That the day for a radical change in the after-treatment of patients, upon whom abdominal operations have been done, is not far distant, is evident from the attention that this subject has recently attracted. The communications that I have received regarding the matter have been numerous, and from some of them it is evident that my position, as to the length of time that patients must remain in bed, is not quite clear to certain members of the profession, who are under the impression that the practice of letting patients out of bed within twenty-four hours is invariably followed. I have never said that I always let my patients out of bed within twenty-four hours, and I thought that my method had been fully explained in an article in the *New York Medical Journal*, January 26, 1907, in which I showed that a routine procedure is never followed. The article referred merely to what might be done under favorable circumstances, and I do not wish to give the erroneous impression that I am unduly enthusiastic upon this topic.

On the contrary, one should and must use discretion in adapting the after-treatment to the requirements of individual cases, and in deciding to what extent the treatment now generally in vogue may be modified. A patient who vomits

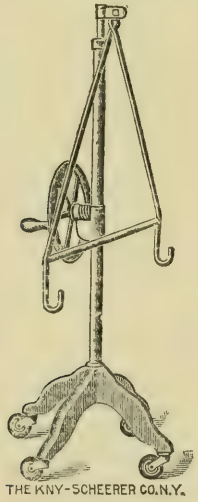
frequently should not be induced to get out of bed, nor should one whose pulse is arhythmic or unusually rapid, or whose temperature is much above the normal. If, however, the condition is favorable, the mere fact that an abdominal operation has been done need not deter us from endeavoring to get the patient out of bed as soon as the effects of the anesthetic have fully passed off. I emphasize the necessity of seeing that, when this method of treatment is used, the abdominal wound shall be properly sutured in layers, as described in the article to which reference has been made, and catgut, which can in every respect be depended upon, shall be used throughout; furthermore, it is absolutely imperative that a properly adjusted Scultetus binder, made of oxide of zinc plaster, shall be applied. I am even more convinced of the necessity of the binder than I was at the time when the paper referred to was read before the Southern Surgical and Gynecological Society, because of an unfortunate mishap, the details of which I will narrate.

Until that occurrence there had not been in my experience a single instance of unfavorable result that could be attributed to the early rising from bed. I stated in my paper that the wound would be absolutely secure from any accident if such a Scultetus binder was applied, but I should have added, *provided that the plaster is trustworthy in its adherent qualities.* I had, up to the time of this accident, always used plaster made by a very reliable firm, when in one of the hospitals where I operate a new supply of plaster was obtained, but, as I later learned, from another firm. It was noticed, by my assistants and myself, that this new plaster was not of the same good quality as the plaster previously used, and that it later became necessary to reinforce the Scultetus bandage on a number of patients, and to renew the bandage sooner than had been the case with the plaster formerly used. Unfortunately, I did not fully realize the gravity of using the inferior quality of the plaster, so that the carelessness of the manu-

facturer resulted seriously in the case of an abdominal hysterectomy for a myofibroma. The tumor was a cervical myoma, six inches in diameter, which caused pressure symptoms and atypical bleeding. The operation was no more difficult than is usual in cervical neoplasms of this nature. The woman was out of bed on the second day, and every day thereafter, until the accident was noticed. A bronchial catarrh, which she had had before the operation was undertaken, caused considerable annoyance from coughing. On the afternoon of the sixth day my house surgeon informed me that the patient, who up to that time had been in good condition, except for the anemia caused by the atypical bleeding, and the bronchial catarrh, was not so well, and that her temperature had risen, so that he suspected suppuration of the wound. He took off the cloth binder and found that the plaster binder, having become loosened, had slipped. He removed the plaster and found that the entire wound had burst open, and that coils of intestine had been extruded between the edges of the wound. How long this condition had existed I do not know, but when the woman was on the table to have a reclosure made by me, the intestinal coils that were protruding from the wound were covered with lymph exudate, and were adherent to the edges of the wound. The wound was closed again with interrupted silkworm sutures and the patient was put to bed. She was then in poor condition, and death took place on the following day. The suturing at the time of operation had been done with the customary care. I believe that this deplorable incident should suffice to settle the question as to whether or not it is safe to permit a patient to rise from bed, soon after an abdominal section, without a plaster binder that is trustworthy in its adhesive qualities.

It is safe and beneficial to let a patient out of bed as early after an abdominal operation as is consistent with her general condition: not after slight operations alone, but also after the

most extensive operations. Operations of such magnitude that the recovery of the patient is doubtful, show the most gratifying results and the most astonishing rapidity in convalescence, if the patients are got out of bed within twenty-four to forty-eight hours. The early mobility induces better assimilation of food and makes circulatory disturbances less likely; hence, there is less danger of thrombosis and its consequences, and less danger of pulmonary complications, which latter are of particular significance in the case of patients



Bed-lifter.

advanced in years. There is earlier intestinal peristalsis, which makes intestinal adhesions less likely than in patients who are kept in the recumbent position; and, consequently, also earlier spontaneous action of the bowels. The better assimilation of food makes it possible for us to begin with a generous mixed diet, as soon after operation as the patient has recovered from the effects of the anesthetic, unless there is some contra-indication. If there is no special reason for inducing an action of the bowels earlier than on the fourth or fifth day, the use of enemas or cathartics should be

omitted until then, as a spontaneous action usually takes place about this time.

There are some patients whose operations are such that it is likely that oozing from torn surface adhesions will occur; or, perhaps, peritonitis existed before the operation or may ensue subsequently, as from the soiling of the peritoneum with pus. These patients are kept in bed, with the head of the bed raised so as to obtain trunk elevation, as recommended by the late Dr. George R. Fowler for diffuse peritonitis. I employ for this purpose a bed-lifter that was made for me; it works on the cogwheel system, so that the patient may be elevated or lowered without any exertion on her part or that of the attendant. Such elevation permits of free vaginal drainage, but if such drainage is not provided for by means of a panhysterectomy or an incision in the posterior vault, the accumulation of fluid in the cul-de-sac has a tendency to remain localized.

There are also patients, about 10 or 15 per cent., for whom early rising from bed is not desirable; for these it will be found beneficial, if the general condition does not contraindicate it, to recommend light calisthenic exercise with their lower and upper extremities while in bed, for a few minutes at frequent intervals. This has a tendency to improve the circulation.

It is essential that the abdominal wound be properly sutured and no better closure than the tier method, with overlapping of the fascia as devised by Noble, can be employed for this purpose, with the use of trustworthy catgut for sutures.

It is unnecessary to go into the full details of this subject again, this having been done in the article quoted. At the present time I desire only to emphasize the fact that early mobility of patients after abdominal section is superior to compulsory rest in bed.

AFTER-TREATMENT OF ABDOMINAL SECTION.

By J. M. Baldy, M.D.,
Philadelphia.

"Many men of many minds" seems peculiarly apropos of the after-treatment of patients upon whom abdominal section has been performed, and, from the exceedingly great variety of methods adopted, it would almost appear that "all roads lead to Rome." Be this as it may, it is certain that there is no one method so far superior to another as to hold a sufficiently large portion of surgeons together with the result of establishing *the right method.* Consequently, we may fairly assume that there is no single method, to the exclusion of all others, which embraces all that is meritorious. It is not at all likely that surgeons would continue in their own particular routine unless their results were satisfactory not only to themselves but to their patients, and the fact that so many different men do continue in so many different ways is sufficient proof, I think, that there are many correct ways, and in this as in so many problems in surgery lies the solution of this question of after-treatment.

What can be more diametrically opposed than one surgeon opening the bowels of his patient, by the use of a laxative and an enema within twenty-four hours after an operation, and another allowing the bowels to remain locked for from five to eight days? And yet each method has its advantage, and the results in both have been good in various hands.

What is more antagonistic than the feeding of one patient

as soon as an appetite is developed, and the practical starvation of another (on slops) for an indefinite time; the free use of morphine and its absolute prohibition; the administration of a stimulant, and its absolute refusal; the enforcement of rest in the dorsal position and the privilege of free movement; the prolonged rest in bed, and the enforced getting-up within from twenty-four hours to a week; the continued administration of drugs on every pretext, and their almost absolute withdrawal? And yet it must be admitted that all of these methods, diametrically opposed as they are, have been used with the utmost success and will continue to be so used.

Personally, I have been guilty of trying all these methods from time to time, and, if my surgical experience has taught me anything, it has taught me this, namely, in the routine case, if my surgery has been satisfactory and my patient has gone from the operating table free from sepsis, hemorrhage, and shock, the after-treatment is of little importance as far as recovering from the surgery is concerned; it is principally of importance as to the relative comfort of the patient. What to me formerly appeared of great moment is now, in the light of a wider experience, amusing and the petty details being continually threshed over seems like making "mountains out of a mole-hill."

Simplicity is the key-note of surgical work as few assistants, as few instruments, as few sponges, as it is possible to work with and work effectively. So it is in the after-treatment. The key-note here is to do as little as possible ourselves, to allow our patients to do as much as possible, as they choose; and when we do act to follow as closely as can be in the lines indicated by nature.

I have found, after the administration of ether, a patient is both thirsty and sick at the stomach, and anything placed in the stomach, even of the mildest sort, will further irritate that organ. Rest and time are the great panaceas; consequently

thirst is quenched by rectal enemas of warm water often repeated—nothing is administered by mouth, neither food, nor drink, nor ice, nor medicine. By the end of twenty-four hours nature has asserted herself, the irritation of the stomach has passed, the thirst is quenched, and the stomach is ready to digest and absorb. By this time the sting of the pain from the operation is considerably abated, and the patient is chafing under the enforced dorsal position. What is to prohibit her drawing up her knees, shifting her body or turning on her side? Absolutely nothing. She desires to do it, and if her desires are not humored she will only suffer the more, physically and mentally. Turning will do no harm, will rest, will relieve anxiety, and will often dissipate pain by encouraging peristalsis and the passage of flatus. If a patient has an appetite and desires something to eat, why deny it or why make her swallow slops when she craves solids? In all seriousness, what is there forty-eight hours after an operation in the routine case which prohibits the eating of anything a person craves? I know of *nothing* and consequently allow nature to dictate in all these matters.

Whether or not opium is harmful in full doses does not interest me much; as a very moderate dose or two in the shape of morphine relieves the primary sting of the operation; takes away the memory of the horror of the first long unending night; its bad effects, if any, are so far outweighed by its beneficial action that I like to use it.

Ordinarily most people feel well when their bowels are moved daily, and there is no exception to this when one is sick. Because one gets well and has not much tympany when the bowels are kept locked, is no reason why we should violate the laws of nature, when we know nature has at this time the extra burden of two extraneous and noxious substances, which may with benefit be thrown off—ether and opium. I see no reason why a bed-ridden person should be allowed to accumulate and absorb ptomains and noxious substances

any more than a well one. The effect of the first movement of the bowels on the patient is most marked for the better, and the earlier this is secured the sooner is the patient off the surgeon's mind.

The question of catheterization is merely one of good nursing; once or twice after leaving the operating table is the limit of allowance; multiplicity of this should mean a change of nurses.

There is probably no great advantage in keeping the routine patient in bed longer than two weeks, and there is a growing tendency toward lessening this time. As far as surgery is concerned this practice is perfectly rational. Wounds in other parts of the body heal up soundly in this space of time, and, if anything, peritoneal wounds heal more quickly. In many cases of abdominal surgery, however, there is a two-fold object to be obtained. This is peculiarly so in the class of chronic or semichronic cases so often dealt with by gynecologists. A very large percentage of these patients—especially the hospital cases—are broken-down, neurasthenic, half-starved, illy nourished, sexually abused women, and the surgery is only a first step toward their recovery. Very many of these women, especially those operated upon for cystic ovaries, displaced uteri, torsion of the tube, and chronic appendicitis, or appendical colic, would be very materially benefited by rest without an operation at all. In such cases an operation, followed by an enforced getting up in two weeks, is irrational, and in twenty-four hours is brutal. What these people need most of all is rest—physical, dietetic, and mental.

Prolonged, absolute rest in bed has no dangers attached to it in spite of the recent arbitrary dictum of surgeons. The assertions as to the dangers of thrombus or embolus and phlebitis, from the recumbent position, are absurdities not borne out in the slightest degree by my own experience, nor has any surgeon yet adduced a proof of sufficient weight

to be taken seriously. I care for no man's opinion if he is unable to accompany it by proof which appeals to my reason. I have been sufficiently interested in this subject to investigate the experience of that body of specialists who deal, to an enormous extent, with patients in a recumbent position, and who are most competent to speak on the subject,—the neurologists.

Following rest cure of from two weeks to three months and longer, Dr. Charles K. Mills has never seen a case of phlebitis; Dr. Wharton Sinkler never saw and never heard of a case; Dr. Weir Mitchell and his son, Dr. John K. Mitchell, have seen but one or two cases, and those from well-defined causes, and Dr. Francis X. Dercum has seen two cases in men, one gouty and one syphilitic.

If the recumbent position was a factor in the production of phlebitis, the observations of these gentlemen would surely have given some indication of it. It being as it is, I think we are perfectly safe in rejecting the theory that a few weeks' quiet in bed is of any serious import in the convalescence of our patients, especially when these weeks of careful feeding, nursing, and rest are productive of a very great amount of good health such as many of these people have not known for years.

I admit that a surgical case may be got out of bed and home in a week or ten days, but I deny that this is best for them, or that this means that their convalescence has been more rapid. Our aim should not be to get them home in the quickest possible time, but to give them the best amount of stored-up health and energy with which to successfully meet the future. One who has got out of bed with health fully restored is surely more competent to meet the necessities of every-day than one who has been quickly put upon his feet, with little regard to his general condition.

DISCUSSION OF THE SYMPOSIUM ON THE METHOD OF CLOSING THE WOUND.

Dr. I. S. Stone.—I rarely disagree with Dr. Byford. It is astonishing that a man can associate with another and be on good terms with him in every other respect, but yet differ as much as Dr. Byford and I do with regard to the care of these patients.

I have not had a case of obstruction of the bowels following any laparotomy since my method of excising the stump after the removal of the tubes at the cornu of the uterus was reported at the Atlanta meeting of the American Medical Association in 1895 before the section on Obstetrics and Diseases of Women.

In the treatment, the first thing I had to learn was that we paid too much attention to the preliminary treatment by purgation. A woman, for instance, is brought in for operation. She has had nothing the matter with her intestines; yet we proceed at once to irritate her alimentary canal with calomel; we drain the bloodvessels by giving salts. We deplete the amount of serum in her blood, and then we expose her to a prolonged operation. As soon as the patient is able to swallow, she is purged again. Very often this is the routine treatment in hospitals, and unless we have constant supervision of the technique we know very little about the after-care of our patients unless we personally visit them and watch them. And how many of us do this?

I think the paper read by Dr. Baldy is very timely, in that it comes between two extremes represented by Dr. Boldt and Dr. Byford. However, since listening to Dr. Boldt's paper of last year he has influenced me materially in getting a certain class of patients up early.

Let us take, for instance, a boy who has been attending school, who is perfectly well until he has an attack of appendicitis. He is attacked in the morning, and I take out his appendix that night. That boy is up walking around his room in a week, and goes home in ten days to a distance two hundred miles away. He recovers perfectly, and goes back to school two weeks later,

less than a month after operation. That boy is certainly as well as anyone. He has no trouble whatever.

In regard to the after-treatment, what Dr. Byford has said has disturbed my peace of mind. My after-treatment has certainly not given me any cases of intestinal obstruction after operation, and it consists largely of letting the patients alone, giving them a little water if they wish it. If vomiting should occur, I would wash out the stomach either with a tube or with large quantities of water, giving no food the first day except albumen and water. I usually give these patients the twenty-fourth of a grain of heroine or small doses of morphine when they are suffering from the effects of a painful operation. As a rule, I give enemas to these patients, say forty-eight hours after operation. There are certain instances in which this ought to be done before this time, but since I have stopped purgation, only giving two ounces of castor oil, as recommended by Ochsner, of Chicago, I have had no trouble from distention of the bowels. The patients have had no vomiting worth mentioning. We have had to wash out their stomachs in not over 1 per cent. of the cases, particularly in hospital cases, after anesthesia, since that plan has been adopted. I never give milk under forty-eight hours, and rarely during the first week, agreeing with one of the gentlemen who have spoken. As a result, the patients have not only been comfortable, but they have seemed to rather enjoy being in the hospital instead of the opposite condition. We know that patients learn to avoid hospitals because they have been excessively purged. It is known that even croton oil has been used by some practitioners, although most of us would hardly dream of using such a purgative as that. In any case which requires croton oil, we had better look out and have the coffin ready, because almost all of the cases die from croton oil if they do not die from the disease.

Dr. B. F. Baer.—The after-treatment in laparotomy should begin, if possible, forty-eight hours before the operation. No detail which might contribute to success should be disregarded. First of all, the surgeon should not forget that abdominal section is always a serious operation. The operative technique, which includes the anesthesia, is the principal factor, but the very

best surgery may be defeated if the patient is not properly prepared, or if the after-treatment is defective.

Nearly twenty years ago my experience led me to formulate a schedule of simple rules to govern the routine treatment of patients before and after abdominal section. An empty colon, the diet, a clean skin, the use of hypodermic morphine, rectal feeding during the first thirty-six hours, early bowel movement by enema, and liberty of motion in the recumbent posture were some of the important things insisted upon.

One-half ounce of Epsom salt is given before breakfast on the day preceding that of the operation, and if two or three liquid movements are not secured during the forenoon this dose is repeated before dinner. No further laxative is given by the mouth until probably a week after the operation, evacuations being induced by purgative enemas. The patient is kept in bed except for bath and toilet. The recumbency favors emptying the congested pelvic vessels and rests the heart and emotions. Elixir of the valerianate of ammonia may be given in 2-dram doses once or twice a day for the same purpose, if required.

The diet is next in importance and should be as free as possible from fermentative properties. Milk, vegetables, and fruit are entirely excluded.

A daily bath is given, with particular attention to the nails, hair, and umbilicus. Unnecessary scrubbing of the skin is omitted. Each bath is followed by a general sponging and a vaginal douche with a 1 to 4000 bichloride solution.

If the operation is to be performed at twelve o'clock or later, breakfast is served at 7 A.M.; it consists of a soft-boiled egg, a slice of bread and butter, and a cup of coffee. One hour before the operation an enema of whisky, f℥j; elixir of the valerianate of ammonia, f℥ss, in water f℥iv, is administered.

Surgical anesthesia only is insisted upon. Ether cyanosis and coma should never occur, and they always mean that the anesthetizer is not alert or is inexperienced, either of which should disqualify him. This would correct the custom, prevalent in hospital management, of making the youngest interne the anesthetizer. The proper administration of the anesthetic is more

important than all the paraphernalia of the modern operating-room or the burning of microbes. These are good, but not the most essential. I was long ago impressed with the belief that more patients are lost from over-anesthesia than from the operation; not, perhaps, on the table, but within a few days, because of paralysis of the emunctories and the consequent easier septic invasion. The surgeon and the anesthetizer should be as one.

The operation is limited to the removal of the pathological condition which rendered it necessary, and further manipulation should be omitted. This excludes the exploration of the abdominal cavity with the hand and arm for the purpose of palpating the other organs. It is the first duty of the surgeon to save the life of the patient; and a very close second is to secure a quick non-septic recovery, so that postoperative adhesions, fistulæ, etc., may not render the last condition of the patient worse than the first.

Toward the end of the operation one-fourth grain of sulphate of morphine is administered hypodermically. One hour after the patient is returned to bed a stimulating enema of whisky and valerianate of ammonia, similar to that given before the operation, is administered. The next enema is given four hours later, but the whisky and valerian are reduced one-half and two ounces of beef juice is added. This last enema is repeated every six hours during the following twenty-four. I call this the supporting treatment, and it has always been very useful.

The hypodermic of morphine which was administered on the table enables the patient to sleep beyond the maudlin stage of returning consciousness, so that when she awakes she more readily obeys the admonitions of the nurse. If she awakes before her intelligence and self-restraint have been restored another hypodermic of one-eighth grain is given promptly.

The action of hypodermic morphine in small dose is altogether different from either opium or morphine by the mouth. It relieves the pain and other discomforts after abdominal section and thereby contributes to the success, more than any other remedy. It quiets nervous irritability and thus prevents nausea

and vomiting. For the same reason it favors intestinal peristalsis and increases the urinary secretion. It is an excellent heart stimulant. Often not more than the second dose is necessary, but if it is, it is given unhesitatingly, the dose being then reduced to the twenty-fourth or sixteenth of a grain. After years of this use of morphine, I have nothing but good to say of it. It removes the thorns and casts roses on the pathway to recovery.

Remedies by the mouth for the control of nausea, including lavage, belong to the dim past in my practice.

From forty to forty-eight hours after the operation the following purgative enema is administered: ℞—Turpentine, f℥ss; glycerin, f℥j; sulphate of magnesia, ℥j; water, f℥iv. As a very general rule, one or more bowel movements result. If not, it is repeated in two hours. Afterward the bowels will move spontaneously, but if they do not, forty-eight hours later the purgative enema is again given.

The nourishment is now left largely to the desires of the patient; milk and vegetables, however, are entirely excluded, until the patient is sitting up and going about.

And this brings me to the last point that I wish particularly to discuss. In a clinical lecture upon after-treatment, delivered at the Polyclinic Hospital[1] in 1891, I used the following language: "The patient will be turned on her side within twenty-four hours, and earlier if she desires. The custom of compelling the patient who has undergone laparotomy to remain in the dorsal position is a barbarous one. It is not only unnecessary, but positively injurious. Two of the most important factors in the after-treatment of these cases are stimulation of intestinal peristalsis and rest of body. By compelling the patient to occupy the dorsal position this order is reversed, the result being arrest of intestinal peristalsis and physical exhaustion from the constant and strained position. I believe the practice has contributed not a little to the mortality, and I am sure it has caused a great amount of unnecessary suffering. Relaxation, not rigidity, is rest."

[1] After-treatment in Abdominal Section, Journal of the Philadelphia Polyclinic, February, 1891.

I never permit the patient to sit up in bed. At the proper time she is placed in a chair. The proper time will depend upon the condition of the patient and the character of the operation. I think, as a rule, ten days to two weeks in bed is the safest course. I cannot believe that it is wise to get these patients out of bed as early as has been advised by Dr. Ochsner and more recently by Dr. Boldt. There is such a thing as progressing too rapidly, as the old philosophers have told us. I read somewhere, not long ago, of the case of a girl of sixteen years, who, having been operated upon for ovarian tumor, was sitting up in a chair sixteen hours afterward; and it was stated that she was sent into the country a week later. Possibly a competitor had a record of having set a patient up seventeen hours after the operation. Truly, this savors too much of the unscientific.

I would say, Do not be in such haste to get your patients out of bed. Give them a little time for rest and to give thanks for their deliverance from a trying ordeal. A few days more in bed is useful to the vast majority of patients after abdominal section.

Dr. Walter P. Manton.—When I read the titles of these papers on the program I concluded that the Society was wasting its time; but I have changed my mind since hearing them, and believe that these questions should be settled once for all today.

Dr. Baldy and I do not always agree, but I think that his paper was one of the most sane, logical, and sound statements of the subject I have ever heard. From my experience with the insane I have come to very much the same conclusions arrived at by Dr. Boldt. I have had many insane women following abdominal sections get up within two hours after their return to bed, walk about the room, and spend part of the first twenty-four hours on their knees and in various other positions. This was before we used the restraining sheet, and not the slightest harm resulted, these women making a perfect convalescence. I do not believe, however, that such practice should be carried out in general. I believe, as Dr. Boldt has said, in certain cases we may get patients up within a few days after operation, but that in the majority of cases of women the patient should be allowed to remain in bed for at least fourteen days. We have

to consider, in these cases, the abdominal wall as well as the intra-abdominal pressure. Where a patient gets up too early, in spite of the best prepared catgut, or whatever suture material may be used, we are more likely to have hernia following operation, especially in cases where a long incision has been made.

Dr. Egbert H. Grandin.—If I had to be operated on, I would be willing to have the operation performed by anyone of you present, but I would pledge you as follows: (1) Do not use any through-and-through stitches, because they act as drains from the skin to the peritoneal cavity. (2) Sew me up in layers, using plain catgut for the peritoneum, No. 2 chromic catgut for the fascia, and subcuticular plain gut for the skin. (3) Do not place cascara or salts into my stomach, as I will simply vomit them. (4) Give me all the water I want to drink, as it will wash out my stomach and stimulate my kidneys. Anybody who has been seasick knows what dry retching is. (5) If I have pain, give me codeine in 2½-grain suppositories, as taught by Fordyce Barker twenty years ago. (6) If I begin to be tympanitic, I would kill the man who had placed a Scultetus bandage on me because my intestines might rupture. If I become tympanitic give me $\frac{1}{50}$ grain of hyoscine hydrobromate, hypodermically, repeated every hour, if necessary, until my pupils are as large as saucers, and do not be afraid to give the physiological antidote, which is morphine, if necessary. (7) When I want Budweiser beer, give it to me. (8) Let me turn over in bed and do everything I want to do in twenty-four hours, if my heart does not contra-indicate. (9) At the end of a week, after a simple operation, get me out of bed, but I will kill the man who tries to get me out in twenty-four hours, because I am not able to get out in that short period of time. My poorest class, inured to hardship from birth, are not able, and my wealthy class, trained in luxury from birth, are equally unable. It is little short of inhuman to force either class out of bed until they feel able and by preaching that such should be done. What is gained beyond the notoriety of doing something which, on sober reflection, common sense should forbid?

Dr. Lewis S. McMurtry was asked to take part in the discussion. He said: I did not hear all of the papers in this symposium. I infer, however, that one of them concerns the after-treatment of abdominal section.

I am quite familiar with the views of Dr. Boldt in this regard. I am reminded in connection with this subject, and have been since Dr. Boldt brought it before the profession, of the fact that Dr. McDowell in reporting the case of Mrs. Crawford, who was the subject of the first ovariotomy, stated that on the eighth day, when he visted his patient, he found her up making her bed, and after reproving her for such imprudence, he induced her to lie down again. This observation in Dr. McDowell's report has been used to prove that his reports were not accurate, that they were, in fact, fabrications; so that we can readily see today how unjust this was to the pioneer in gynecology and abdominal surgery. I presume everyone has had patients, when we regarded restraint after operation very necessary, get up in the absence of the nurse and do all kinds of imprudent things. We have now come to a point in our work where we can safely allow greater liberty, less restraint, after these operations than heretofore. Certainly, it has some advantages. But everything about surgical work has been simplified. I presume none of us now go through the preparation we considered necessary to prepare the patient for abdominal section in former days; when for three days to a week patients were kept under observation in the hospital before they were operated on. These must have been days of great mental distress to the patient. We have altered and changed all that. Operations are now done the following morning, as a rule, after the patients go into the hospital, and certainly there never was a time in the history of our work when the results in the hands of such men as are here today have been so uniform and so perfect. The after-treatment, as now advocated, has advantages. There is no doubt that the earlier patients are gotten up, the more cheerful they are. Their convalescence is more speedy. The state of mind has much to do with the digestive functions, with the metabolism of the body generally, and to put a patient up early after an operation gives a spiriting force to all the powers of

nutrition. It improves the morale of the patient; the upright position materially aids digestion, and so we can readily see why the early getting up of the patient is of great advantage. When we come to the practical part of it, it is apparent, as in so many things we do in practice, that the personal equation of the patient must be considered. Neurasthenic patients and many feeble patients are not benefited by getting up early after operations. They are benefited much by being kept at rest in bed. But the average patient certainly has a brighter convalescence and suffers no harm from getting up earlier. But I think it may be carried to an extreme. A patient, after anesthesia of an hour, and a considerable operation, is not in condition to bear the burden of active life right away. There ought to be a reasonable time allowed for the system to repair itself and for the strength to return before resuming work.

So far as the incision is concerned, the early getting up of patients is now made possible in certain cases, since the introduction of rubber gloves, and since improved methods of asepsis are known by operating nurses in all our hospitals nowadays; whereas, in olden times the surgeon had to do practically all of the work incidental to the preparation of the patient, the preparation of the instruments and dressings. At present, with the thorough training the operating-room attendants receive, these things are eliminated. Postoperative sepsis is practically eliminated. Stitch abscesses are made rare by using rubber gloves and by the improved aseptic technique, so that the danger from hernia is comparatively little.

I assure you, gentlemen, it has been a very great pleasure to me to attend this meeting of your Society, a society which has done so much for our specialty, and I wish to thank you very much, Mr. Chairman, for the courtesy extended me.

Dr. Beverly MacMonagle.—I did not get here in time to hear the substance of the papers. However, I read over a synopsis of the paper that was read by Dr. Boldt, and I have seen something in my practice during later years which is rather different from what I had seen before.

The emergency cases that come to me now very often require operation to be done within a few hours. Take the cases of

appendicitis that have been going along for twelve, twenty-four or forty-eight hours, you feel you cannot let them go along any farther without operating. I find that with the careful preparation I give a patient an hour or two after making the diagnosis at the hospital, of getting the abdominal wall as clean as I possibly can without injury to the skin, the results in regard to infection of the abdominal wound and the results in regard to the healing of that wound, and the firmness of the muscles, etc., are as good as they were when I prepared my patients formerly for three days or a week in advance of operating on them. Therefore, I am not so loth to undertake abdominal section if a case comes to me and I can have sufficient time for a nurse or an assistant to prepare the patient. A great point is to wash and clean the skin thoroughly without injuring it, for when sufficient scrubbing has been done to make a break in the epidermis we increase the chance of infection by the staphylococcus. We all know that the staphylococcus is in the skin, and I believe the more the staphylococci are stirred up the worse it is for the patient.

With regard to making the incision, I think we are all in accord with the view that since we have taken up muscle splitting our wounds come together better and are firmer than they used to be. Also, since we have gotten to the point where it is unnecessary and unwise to drain our cases, as much as we used to, and since we have dispensed with drainage and are closing our incisions, in the first instance, it is a fact that our cases of hernia and of infection of the abdominal wound have decreased considerably. The bringing of the wound together by stitches has been made so complete by the manner in which catgut has been sterilized, by the way in which catgut has been made to last for a definite period, and so little injury has been inflicted by individually splitting the muscles, that the tissues which have been separated by the knife and split by blunt dissection, are brought together exactly as they were taken apart, beginning with the peritoneum and from the peritoneum out, they are in nine cases out of ten parallel. This is a simple method. I do not know why we should have a stitch so strong that a man cannot break it. If the tissues are split, the natural tendency is

for them to fall together, and any exertion on the part of the patient tends to bring them closer together instead of separating them. Since we have come to the decision that muscular action shall be brought into use in closing wounds, and since we have come to realize and to rely on the fascia for strength, when that fascia is properly brought together, with the intervening tissue and without trauma, we have solved the question. It has been immaterial as to what sort of stitch was used. At one time I used silver wire; at another time silkworm gut. I now use carefully prepared catgut, and if my catgut is sterile I find that the number of infections I can trace to it amount to comparatively nothing. I do not insist on the use of chromicized catgut. I have not come to the point where it seems advisable, after the abdomen is opened, to do a large amount of surgery inside, cut off vessels, nerves, take out organs, stitch the bowels, etc., and then say to the patient, after having sewed her up: "You can get up, take your bed and go."

It was the fashion to use some instrument that is supposed to hold the parts together, but which will not do so, such as a bandage. I do not understand how you can put a bandage around a patient's body which will prevent her from having some muscular action. You may apply a bandage, but when you take it off there is likely to be a good deal of distress or trouble. I do not believe in such apparatus. I am willing to be convinced, however, that any apparatus will do very much toward holding a wound together.

Dr. Willis E. Ford.—I would like to protest against the gridiron operation in cases of appendicitis in which we have reason to suppose we must institute drainage, as where there is gangrenous tissue. When a blood count is properly made, knowing whether you get leukocytosis or not, you can determine accurately whether it is going to be necessary to drain or not. The accidents I have seen in my region of the country, after early operations for appendicitis, have been very largely due to the gridiron operation, splitting the muscles, where an attempt has been made to put in a drain, instead of making an open incision, which ought always, it seems to me, to be made through the muscle in case there exists any sloughing tissue whatever. If

you are absolutely certain that you are not going to drain, or that you do not need drainage, then the gridiron incision is all right.

As to the closure of the wound, it does not make much difference if it is clean. I put gauze and a bandage on these wounds and do not see them any more.

Dr. Richard R. Smith.—I would suggest the use of heavy silk for relaxation sutures instead of silkworm-gut, as is usually used. The individual layers are united with catgut—the silk used for reinforcements only. Heavy silk cut in convenient lengths is wound upon glass rollers and sterilized by dry heat. It is then dipped into melted sterilized wax (over a water-bath), to which 10 per cent. carbolic-acid crystals have been added. It should be kept in this until all bubbles disappear. When used the suture is pulled through gauze to remove superfluous wax and doubly threaded, so that the suture may be passed from within out. It does not include peritoneum, but it does include muscle, fascia, and skin. This suture has the advantage of being strong. It cannot, under any circumstances, give way, so that you need have no worry about the wound gaping, whatever the strain upon it. In this it has the advantage over silkworm-gut, which may do so.

I also endorse what Dr. Grandin has said in regard to the giving of water following abdominal operations. I give orders to the nurse that the patient may have all the water she wishes, and I believe it is a good method. But, like all other good things, it may be carried to excess. If the water returns clear and soon after giving, I modify the amount or even discontinue it.

Dr. E. W. Cushing.—There is one important point that has not been touched on, and that is in regard to the after-treatment of giving no more ether than is possible. I have been much interested lately in the combination of morphine and scopolamine anesthesia or morphine and hyoscine anesthesia, on account of the very small amount of ether that is required afterward by the patient. I do not mean that we should operate without ether, but we may diminish materially the amount of ether when the combination I have mentioned is given as a preliminary.

As to the closure of the wound, I find that plain catgut, thoroughly baked, is sufficient to bring the fascia together, and if the fascia is coapted accurately there is no danger of hernia; in fact, I have not seen a hernia in the last ten or twelve years. It seems all that is necessary.

The rest of my ideas have been fully covered by what Dr. Baldy has said.

Dr. Charles P. Noble.—In reference to the preparatory treatment of patients, I shall have practically nothing to say. I agree with those who believe in clearing out the alimentary canal and giving plenty of water before operation.

So far as the closure of the wound is concerned, I have written so many papers on that subject, I will not discuss that question.

The only point I wish to say anything about is the new teaching of getting patients up quickly after operations. I am very glad to find myself in accord with my townsman (Dr. Baldy); there must be some valid reason assigned if we are to change our practice in getting patients out of bed. It seems to me, so far as the great mass of patients that gynecologists deal with is concerned—broken-down patients—the rest they get in bed, after the usual method of treatment, does as much to restore them to health in many cases as the operation itself. If we were operating on a case of interval appendicitis, or on a case of acute appendicitis, in an otherwise healthy individual, these remarks would not apply; but for the great mass of gynecological patients rest in bed and supportive treatment are valuable parts of the after-treatment.

I was interested in Dr. Boldt's report of his cases of eventration. Since this method came about I know of one case of fatal embolism, and have heard of a number of cases of hernia among patients who got up early. In other words, it seems to me, the burden of proof rests on the gentlemen who wish to introduce this very radical innovation, and until they have had enough experience to show us that thrombosis, phlebitis, and embolism are less frequent after this method than after the one that has been in vogue, the supposition is that the older method is the better. The burden of proof rests with them; and, it seems to me, if these accidents occur after the more radical getting up of

patients, it would be rather unfortunate for the gentlemen if their cases should assume a medicolegal aspect.

Dr. John F. Thompson.—There are two classes of cases I wish to speak about: one, the thin-walled patients, where from pressure of a large tumor there has been absorption or stretching of the recti muscles, and where there is practically nothing left but fascia, and on the fascial plane we depend for a strong wall. I wish to point out the absolute necessity in these cases of doing what has been alluded to, namely, overlapping the fascia; we have no muscular structure to depend on whatever. The other class of cases which, I think, has not been mentioned, will furnish a large number of herniæ, namely, those women who have fat abdominal walls, and I want to call attention to what seems to me to be a good method of closing these walls. Put interrupted sutures at a distance of an inch, allowing the skin to gape for a while to a slight extent, and also allowing for the escape of the liquefied fat which takes place in these cases. That is a method which I have tried in these fat-walled women, allowing for drainage of the liquefied fat, because the closely sewed skin will retain the broken-down fat which easily becomes septic, and which leads to the breaking down of the wall.

Another thing which occurs to me with reference to these cases is that we are more likely to observe the occurrence of hernia in women after the induced menopause when complete removal has been done. The hernia follows, not on account of any defect in the technique, but it follows from the inevitable accumulation of fat in the abdominal wall, and the tendency to degeneration of the recti muscles from this accumulation and the deposition of fat in the omentum, which leads to undue pressure. So that a hernia coming on in a year is not due to any defect in technique, but due to a defect in nature, whereby the deposition of fat takes place and renders the wall weak.

Dr. Robert A. Murray.—I have but a word or two to say in regard to the treatment of these cases. Most gynecological patients come to us because they are sick. Do we, by taking away the cause of the suffering, cure these patients? No. We have to get rid of the results of the suffering. If we remove a tumor; if we relieve a suppurating mass from the abdomen,

does that make the patient well? No. We must get rid of the results. If that patient had not been run down in health, perhaps suffering considerably, she would not have come to us. She has poor metabolism, imperfect digestion, clogged bowels, and we have got to get rid of those results. We must get rid of the cause to prevent bad results, as when we operate for appendicitis to prevent peritonitis, or where we remove a suppurating tube to get rid of the effects of the suppuration. In my practice such a patient is allowed to get out just as quickly as I can restore her to a condition where she can go around and otherwise improve her health herself. But in all these cases, when they have had a severe trouble or ailment, we must expect to keep them in bed and nourish them and get them in a condition to take care of themselves. It is futile, in my judgment, to say that we can establish a rule to get these patients out of bed in a week or less after major operations. If we were to do that we would empty the beds of a hospital, but would leave our patients uncured, with a protracted convalescence that would bring disrepute to surgery and prevent many patients from availing themselves of its resources on account of the long disability after leaving the hospital.

Dr. William M. Polk.—There is a good deal in the position taken or advocated by Dr. Boldt, so much so that it is worthy the attention of every member of the Society. As with many questions that pertain to our work, there are two sides, and these have been ably presented by the gentlemen who read papers, but it comes down to the point emphasized by Dr. McMurtry, namely: "The personal equation must of necessity enter very largely into every case that is brought before us." It goes without saying, it would be not merely a hardship but a wrong to get some of these patients out of bed in the time specified. On the other hand, we all know perfectly well it would not be wrong for us to allow certain patients to get out of bed soon after operations; it would be a great pleasure to us and a privilege to them to get them out of bed. They feel the need for action. In this connection there is a question that has caused me no little concern, and that is the matter of phlebitis, thrombophlebitis, embolism, and cardiac embolism. We all know that

these complications occur following operations. We have in the past stood before our patients, folded our hands, and indicated if not asserted it was the hand of God and not the doctor. It was not to a large extent the hand of the doctor. Is it not possible for us to differentiate those cases in which it might be well to permit activity after operation from those in which a longer rest in bed should be enforced? I suspect, if those of us who have had the widest experience looked back, we would find that some of our worst cases of embolism have been those which we have nursed in bed with the greatest care. Of course, it is evident that any patient who has had an operation performed upon a region of the body which we occupy in our work, who runs a slight temperature, is of necessity in one stage of clot formation. In other words, that phlebitis is at work. Beginning with the smallest ramifications of the vessels, we know it takes but a short time for thrombi of sufficient size to do the worst damage. If we have a patient who runs a temperature of that sort, and we cannot trace the trouble to a defect in the abdominal wall, it requires courage to get that patient out of bed. But the question arises, "Is there any harm in doing it?" Is it not possible by allowing these patients to get up, in the face of elevation of temperature, which we suspect is due to the formation of thrombi in the smaller vessels, to divert or arrest the progress of affairs? At any rate, is it not worth while? Is it not possible for us by getting them out of bed to further the cure rather than to further the danger we have in mind?

Dr. Gordon.—None attacked my position particularly as to the method of closing the wound except inferentially. If there is any one thing that has illustrated the folly of depending on tier sutures it is the case related by Dr. Boldt. I will guarantee that if in that case he had closed the wound as I do, he would not have had the patient's intestines come out and the patient die within twenty-four hours. It is absolutely impossible to demonstrate any of these things beyond what one's experience will justify. Dr. Grandin says he does not want to have any through-and-through sutures in his abdomen. I sincerely hope he will never have to have any. If he should have an abdominal section, I trust the surgeon who operates on him will use suture

material which will hold the incision together, so that his bowels will not burst out. His objection is that the suture material drains into the abdominal cavity. Nobody can absolutely demonstrate that it does not; but I am quite sure, even after twenty-four or twelve hours, the peritoneum will have been absolutely closed, so that there will be no danger of leakage. I feel absolutely sure, when I put silkworm-gut through in the way I have described, from within outward, I have something that will surely last two weeks. I keep it there two weeks without disturbance, and believe there is less liability to infection. I do not believe any man, who depends upon the tier system of suturing, can feel nearly as safe by having his patient get out of bed at the end of twenty-six hours or more as he can with the method I have described. The idea of expecting a Scultetus bandage of the ordinary plaster, such as we get, to hold the abdominal wound together is absurd to me. I should feel I had been guilty of malpractice, and would not be able to make a good defence if I were sued, if I attempted to hold the abdominal wound of my patient together by any such measure as that. I would be glad if we could have something which would hold the wound together without using any sutures; but in the absence of that, in order to feel absolutely secure, I want something that I can use and depend on to last for at least two weeks. As I stated in my paper, we are pretty well assured that it takes two or three weeks to get absolute coaptation—absolute union.

As to the management of these cases after operation, my rule has been for many years to give the patients all the water they want, especially if they are vomiting much. It washes the stomach out; they stop retching and straining, which must be a very important matter to those men who do not use a through-and-through suture. I give them plenty of water to drink. I use opiates to allay pain. I believe these patients are entitled to that. If I do not get free action of the bowels beforehand, which I like to do, generally I like to get it pretty soon after. ward. Those of you who remember Dr. A. Palmer Dudley, will recall that he began to give his patients laxatives within six hours after the abdominal operation was completed, and his idea was to induce peristaltic action to prevent adhesions in

the early stage. His patients did well, so far as this was concerned. I have not used eserine salicylate, which was referred to by Dr. Vineberg.

I am not particular about patients eating until they want to. When they do, I let them eat anything they want, within reasonable limits. The routine treatment of a teaspoonful of hot or cold water to my mind is absurd. Inasmuch as these patients are straining and retching, let us give them something to vomit; give them some chance to empty the stomach without straining the wound or anything else. I believe we have all followed a routine method, more or less, in these cases, and we have not followed nature's indications, which, to my mind, are the best we ordinarily have.

Dr. Hunter Robb.—In reference to the position taken by Dr. Baldy, I wish to say that I quite agree with him that there is no one method which can be carried out, and which is *the only* method. It is interesting to observe how many men will employ practically different methods and yet obtain the same results. If our patients can be made comfortable, and we are contented as to their condition, that is all we are after. No one method can be adopted to the exclusion of others that are equally good.

In reference to the method advocated by Dr. Boldt, I am exceedingly interested in it, and *a priori* we would condemn it; but before we utterly condemn any method such as this we should wait and see what the end results will be. If Dr. Boldt can give us as good end results from the standpoint of convalescence and the ultimate condition of patients, then the method must necessarily appeal to us. However, we all know that many patients after abdominal operations, even if we keep them in bed for three or four weeks, complain for a while; and if we can accomplish or achieve as good results as in those cases, it is time well spent. The danger of hernia and phlebitis has been alluded to. I believe phlebitis may result from a change of the patient, although that is one of the reasons why the early getting up of these patients is advocated. But, at any rate, before we condemn this method of Dr. Boldt we ought to try it and speak from our own experiences, or base our judgement on Dr. Boldt's ultimate results in the after-treatment of these cases.

Dr. Byford.—In my paper I failed to emphasize the fact that intestinal distention is a common cause of discomfort after abdominal section. The relief of this condition is alone sufficient not only to justify the early administration of laxatives, but to call for it.

I allow my patients all the water they want, but in small quantities frequently repeated, viz., an ounce or two every fifteen or twenty minutes, and have noticed no bad effects. I give no food by mouth during the first day, mainly because the stomach is upset by the anesthetic.

Catgut sutures are good to coapt the tissues, but they should not be depended upon to sustain any strain upon the abdominal incision. The longer they remain in the tissues the longer will the edema and round-cell infiltration about them persist, and the longer it will be before the line of union is firm. Thus the more catgut that is used the less able is the line of union to stand strain. I still use buried silkworm-gut sutures about an inch apart in the large abdominal incisions. Half-way between them I often place a fine plain catgut suture in order to coapt the edges perfectly, but not to stand the strain. The silkworm sutures stand the strain and the catgut sutures are quickly absorbed and out of the way.

Dr. Vineberg.—I gather from the discussion that no one has had any experience with the use of eserine salicylate. I think it is worthy of trial. When we consider the comfort of our patients, and when eserine salicylate is given in suitable cases, I feel sure there will be less distention of the bowels. For some time I have been noticing cases in which wounds had healed primarily, but nevertheless in a year or two there was a considerable diastasis of the recti muscles. That I found in cases even where there was not a large tumor causing the diastasis, and for the past few years it has been my custom at the time of the operation, where there is separation of the recti muscles, and in those cases where there is not, not only to overlap the fascia, but to first expose the recti muscles the same as we would for an ordinary ventral hernia, bring them together with catgut sutures, overlap the fascia, and putting in the suture at this edge and over here in this manner (indicating), and I have

been well pleased with the results. Many of the cases we operate on, probably their symptoms are as much due to enteroptosis as to the slight inflammatory condition of the pelvic organs; and we find, it seems to me, a good practice in these cases to adopt measures to remedy the enteroptosis.

I want to say a word or two with reference to getting patients up early after operation. It is our custom to examine the urine daily for two or three days after operation. It is surprising to note in what a large percentage of cases albumin and casts are found in the urine for some days following operation. With that condition, it seems to me, it would be wrong, even though the patient is getting on satisfactorily, to get her out of bed and about.

Let me mention another point. I find a good many of my patients suffer more from adhesive strips we use than from any other cause except the nausea and vomiting the first day or two. When one uses an extensive adhesion bandage and keeps it on a patient for two and four weeks, I am sure there must be great discomfort from it. I do not understand how it can be avoided. We have tried all kinds of adhesive plaster, and the best of them will produce an abrasion of the skin and cause much discomfort.

Dr. Smith.—I will use my five minutes in speaking of sutures and suture material. I have reasons for insisting on my patients coming into the hospital at least two days before operation. They are given three hot baths. We know that the staphylococci are situated in the epidermal layers of the skin, and it is essential to give the epidermis a good soaking. Since I have been doing this, I have had almost no stitch abscesses. I prefer through-and-through silkworm-gut sutures, passed with a big perineum needle, in one side and out the other, closing the incision quickly in that way, because when I go home I know that two men could not pull that wound open. I have closed wounds five hundred times with silkworm-gut sutures, and two hundred and fifty times with layer catgut. I do not like the latter. Twice catgut has failed me, although chromicized, in the last three weeks. Four days afterward it melted away, in one case the incision opened, and the intestines came out. I dislike catgut very much. The

only cases I have used it in were fat women, and I dislike fat women for the reason that I cannot use silkworm-gut in closing their incisions.

We should remember also that a change has taken place as to the method of incision. We used to make it over the linea alba, now we cut through the fascia, take the handle of the scalpel and separate the fibers of the rectus muscle, and when you close the wound you have the muscle coming together in a broad line of union. I lay my knife down as soon as I cut through the fascia, and do the remainder of the operation with scissors. I do not cut the muscle.

One of my axioms is that it is unlucky to look at the incision for three weeks, and the first dressing stays for three weeks unless the thermometer indicates there is something going wrong. I usually leave the wound alone for this length of time, then remove the dressing and take out the silkworm-gut sutures. You will find that primary union has taken place in nine times out of ten.

Dr. Wylie.—This discussion, I think, will lead to something. It makes plain what I hope some day will come, that surgeons will be taught the laws of physics and practical mechanics and more of the artistic side of our work before they begin surgery. If that were so, there would not be such a great diversity of opinion and of methods of closing the wound as have been manifested in this discussion. This subject was of great interest to me many years ago, at which time I read a paper on ventral hernia and covered most of this ground and answered so many of these questions. At that time, in doing abdominal surgery I had been using glass tubes, instituting drainage freely, with the result that I had a good many cases of hernia, 3 in one year. I operated on 8 cases in which hernia entered my service in my second year at Bellevue, which was begun in 1882. That paper was based on two or three years' actual practice, and I came to the conclusion that in the median line the real tendon of the transversalis muscle is the fascia of the recti. That can be proved; the muscles, even longitudinally, have little or no transverse strength, and I believe in injuring them as little as possible. When we go above the umbilicus we have a different condition. There the

principal strength of the tendon is united or directed over the peritoneum and muscle of that tendon. After trying different sutures, and even catgut at the time, I found temporary sutures would not do in hard fascia. The shortest period for the healing of the tissues (bone three weeks) and fascia was about two weeks. By actual practice it takes fully two weeks or more to get strong apposition of the tendons, which give strength to the abdominal wall. Therefore, we must have a suture that will last that long. Since I have been using *fine* sterilized silk and burying the sutures I have practically had no herniæ. One of the principal objections to the getting up of patients in less than two weeks after operations is that injury may be done to the patient and the wound. There is no question but what, if we take a woman who is constipated and in bed many weeks with a local or general peritonitis, it takes more than twenty-four hours for one dose of oil to clear out the intestinal tract. We must take more time.

Let us take the emergency cases who have not been previously sick. We operate in twenty-four hours. The stomach and intestines of these patients should be emptied. We should look at the matter in that light, treat each case individually, and remember that certain great laws of physics and mechanics must be observed no matter what the apparent results. I can recall a number of cases in Bellevue Hospital, especially among foreign women, many of whom could not speak English, who, in spite of the care we took, got up, went to the water-closet and had bowel movements, with a glass tube in them six inches long; yet no bad results occurred in those cases, but this would not justify letting these cases get up and about.

Years ago I had a good deal of experience in having patients with a form of phlebitis that came on late. It did not show itself early, but some time after the operation, and it is a curious fact that almost every case of phlebitis I had happened after the patient was up, especially if the vessels were large, such as in large fibroids, and I believe allowing them to get up early, lifting them on to chairs, instead of allowing them to lie in bed for more than two weeks, was probably the cause of these cases of phlebitis.

Dr. Boldt.—I agree with what has been said, that no one method of treatment is applicable to all cases. The protest of one man who has not had personal experience with the method I have advocated cannot be taken seriously. Why should we take it seriously? We can only judge of the value of a method by the observations of those who have had a large personal experience with it and who have the courage to gain that personal experience by following this after-treatment. As Dr. McMurtry and Dr. Polk have said, it is a matter of personal equation. No one has maintained that we can follow a routine treatment in these cases. It would not be wise to do so. We must consider the patient, also the surroundings prior to and during the operation. If, however, a woman is in good condition, with a little coaxing on your part, she may be induced to get up after the lapse of two or three days. If you should urge a patient to get up early after operation, and she should say to you, "Doctor, I do not feel like getting up," by coaxing her a little you can probably induce her to get up, and after a short time she will tell you that she feels easier and better. I have had many patients tell me that.

Objection has been raised to the Scultetus bandage, on account of the discomfort caused by it. The discomfort caused by this bandage is outweighed by the subsequently more rapid convalescence, and I defy any surgeon to show me a patient who can go about her usual vocation three weeks after an abdominal operation if she is kept in bed for a period of two weeks or longer. I have done this with the quick getting-up method.

Dr. Baldy and I do not disagree so very much, particularly when he speaks of giving his patients full diet and allowing them to turn around in bed; but if he allows them to stay in bed for two weeks, then we differ. Dr. Baldy quoted from gentlemen who treat medical cases. There is much difference between a medical patient and a surgical patient. A patient who is neurasthenic can be sometimes kept in bed beyond the usual limits with great advantage and benefit to her physical condition.

I do not think we can accept seriously the vague statements of herniæ and embolism having occurred after the early getting out of bed. If the gentlemen who make such statements will give us statistics, we will consider them, but for any gentleman to say

that he has heard of a case of embolism or one of hernia does not signify anything. So far as I have been able to determine (and have instituted a conscientious comparison between embolism and thrombosis after early getting up) these complications have been less in frequency than after the old-time treatment of keeping patients in bed for a long period of time. The Mayo brothers have informed me that these complications are about one-half or two-thirds less in those patients whom they get up in a week's time after operation than in those who are kept in bed longer.

With regard to what has been said concerning the Scultetus bandage, I will say that if this bandage is properly applied, and plaster used that is trustworthy in its adhesive qualities, it is reliable, and the wound is not likely to burst open. An unreliable plaster should not be used. We should use a plaster that is very reliable in its adhesive qualities. To repeat, if you will try it, I am sure your opinion of its value will be confirmed. I have failed yet to hear from anyone who has had 15 or 20 cases treated in the manner that I have described, who has become dissatisfied with the method, and I hope Dr. Baldy will be encouraged to continue the method. I feel reasonably sure that after he has tried it he will accept it.

Dr. Baldy.—I would like to ask Dr. Boldt how long he has tried this treatment?

Dr. Boldt.—Nearly three years.

Dr. Baldy (resuming).—Since Dr. Boldt's paper was read before the Southern Surgical and Gynecological Association last year, I have tried this method of after-treatment in 15 or more cases at the Polyclinic, and do not hesitate to condemn utterly the getting of patients out of bed in twenty-four or forty-eight hours. Dr. Boldt asks us to wait for experience. Does any man want more experience and condemnation than his report today of the results in this class of cases? Experience gives us lawsuits and deaths (I include in that statement Dr. Noble's statement of a death from embolism). It is undoubtedly true that some of these patients may be gotten out of bed in from twenty-four to forty-eight hours after operation without doing them much if any harm. Some of these patients are bright and cheerful when they are allowed to get up early after operation. They

will appear pleasant to you when you go into the wards. But personally a smile does not interest me as much as my end results. If I find the incision has opened in 1 case in 100, as a result of allowing the patient to get up too early, I prefer to keep the whole 100 in bed a few weeks. If I find embolism occurs from this method of after-treatment, and in addition to that I am going to have the personal discomforts incident to a lawsuit, God save me from continuing such a method. These cases of embolism occur in about ten days to two weeks after operation, especially the form that strikes the leg. In other words, all patients who get embolism get it before the period of prolonged rest in bed, and when we are told that embolism is the result of prolonged rest we know it to be untrue.

Somebody has mentioned ether, and it is pertinent to the present discussion. I have long since felt that the most important man outside of the operator in the operating-room is the anesthetizer. I believe that anesthesia kills more patients than all surgeons together, and I believe it is a burning outrage that the profession countenances and the community allows internes to give ether to our patients. I believe the day will come when every institution will pay a man a good salary, so that they can secure skilled men for this purpose, and that strict instruction should be given to the internes before allowing them to handle the anesthetic alone. If necessary, I would like to see this done by legislative enactment. We sacrifice not only much time at the operation, but I believe many of these accidents, such as separation of the incision, embolism, death resulting two or three days after operation, etc., are due directly to the faulty etherization at the time of the operation.

AN APPRECIATION OF THE WORK OF DR. HENRY J. GARRIGUES IN INTRODUCING ASEPSIS INTO OBSTETRIC PRACTICE.

By Brooks H. Wells, M.D.,
New York.

It is with the greatest diffidence and the greatest pleasure that I rise to speak before you today. Diffidence because of my unworthiness of the honor, and pleasure that I may help to keep bright the laurel that gleams above a brow frosted and seamed by the snows of more than seventy winters.

In order that you may realize how great a thing was done when sepsis was driven by Garrigues from the New York Maternity Hospital in 1883, let me remind you that it is less in measure of years than the years of a strong man's life since Oliver Wendell Holmes, in his immortal essay on puerperal fever, said so bravely: "The time has come when the existence of a private pestilence in the sphere of a single physician should be looked upon not as a misfortune, but a crime." Five years later Ignatz Semmelweis, a young assistant at the Vienna Maternity, was derided because he persistently held that every case of puerperal fever was caused by the absorption of putrid animal material.

These assertions of Holmes and Semmelweis marked the first gray gleaming of a dawn that, obscured then by the clouds of derision and apathy and the mists of imperfect knowledge, has gone on to the clear light of a glorious day. Now we know that puerperal fever is puerperal septic infec-

tion; we know how to prevent it, and we cannot shift the responsibility.

At the time of the epidemic at the New York Maternity conditions were different. The significance of the part played by the various bacteria was only beginning to be appreciated. It is true that Playfair, in the fourth edition of his *Midwifery*, issued in 1882, included all postpartum fevers under the head of puerperal septicemia; yet he admitted "there were facts difficult to reconcile with theory and for which we were unable to give a satisfactory explanation."

Gusserow, in the same year, in commenting on the factors influencing the mortality at the Maternity of the Charity Hospital in Berlin, admits that *locality* has not the absolute importance it was formerly supposed to have and that Semmelweis was correct in defining puerperal fever as a wound infection. Thomas More Madden, at the meeting of the British Medical Association in August, 1883, held that it did not matter by what term we distinguish the malady, provided we recognize that there is "a specific infectious disease consequent on parturition" and that it is largely modified by the intensity of the septicemic condition, by the previous condition of the patient, and by the prevailing epidemic constitution of the atmosphere. He holds that large maternity hospitals would be desirable if they were only safe, but that in all hospitals where a number of women are confined together a "specific puerperal atmosphere" is necessarily created.

Kinkead, Professor of Obstetrics at the University of Dublin, taught that "such fever, from whatever sources arising, except septicemia, is a specific infectious disease," and that "it occurs epidemically and sporadically, like any other infectious disease."

In the winter of 1883–84, partly because of the dreadful conditions prevailing at the New York Maternity, the subject of puerperal fever was prominently before the profession.

In a somewhat heated discussion before the New York Academy of Medicine in December of 1883, T. G. Thomas defined puerperal fever as "an infectious disease due, as a rule, to septic inoculation of wounds in the genital tract." He held that some toxic agent existed, but would not admit that the "round micrococci" could be important factors in its etiology. Polk thought Thomas should have planted himself squarely upon the view which regards puerperal fever as identical with septicemia. At a later meeting Fordyce Barker, who still clung to the old dogma of a specific disease, ridiculed these ideas. "Does every parturient woman," he asks, "in performing the function of maternity, like the scorpion that carries in its tail an agent for suicide if death be threatened by fire, physiologically generate an equally fatal poison in a corresponding locality?" If so, it seems to him evident that "the State should make childbearing a penal offence for families who did not have means enough to carry out elaborate antiseptic requirements."

It is seen by these references that while the bulk of the profession held more or less to the idea of a septic poison, there was much concerning the exact nature of this poison that was vague, for the science of bacteriology was yet young and the old idea of a specific puerperal fever was hard to kill. Stadfeld, at the Copenhagen Maternity, had used carbolic acid as a disinfectant in his wards since 1870, and similar measures were employed by most obstetricians. These early efforts, however, were but gropings toward the light and were only moderately successful. Outbreaks of puerperal fever still frequently occurred, and there were still those who believed in the "epidemic influence of the air."

But the time and the opportunity were waiting for him who should have the clear insight and the courage to put aside the ancient dogmas of the established order and to replace them by the new ideals of surgical cleanliness.

In 1881 the mortality at the New York Maternity Hospital

was thought to be very low, as it was only 2.36 per cent. In 1882 it had risen to 3.25 per cent. In the first nine months of 1883, with 345 deliveries, 30 women died and the serious morbidity was enormous. In September the conditions were at their worst. Ten of the women delivered during the month died, about 1 in 4, and the survivors escaped miserably with their lives.

At this time (October 1) the rotation of service brought Dr. Henry J. Garrigues again in charge. In the fulness of maturity, energetic, thoughtful, calm, he proved to be the man superior to the emergency. Appalled at the frightful conditions, he had already formulated and at once carried into effect a detailed plan for driving out the pestilence. This plan was original in its detail, showed a broad comprehension of the principles of asepsis, was brilliant in its achievement, and of far-reaching influence on the practice of obstetrics. In brief it was as follows:

Rapid alternation of wards was secured, so as to allow frequent fumigation with sulphur, followed by scrubbing with soap and water and by a 1 to 1000 bichloride solution. Fresh bedding was furnished at each change. The floors were sprinkled four times daily with the bichloride solution. All visitors were rigorously excluded. Doctors and nurses employed in the maternity were not allowed to enter the other hospital wards or the dead-house. The patient had a bath and clean linen beforehand, and on entry to the delivery-room the abdomen, genital region, buttocks, and thighs were washed with soap and water and then with bichloride solution. The vagina was irrigated with two quarts of the solution from a glass fountain syringe with glass nozzle. The rubber sheet on the delivery bed was frequently renewed and washed before each delivery with a 1 to 1000 solution.

No vaginal examination was allowed except after the hands had been thoroughly scrubbed with soap, hot water, and a stiff brush, and soaked in a hot 1 to 1000 bichloride solution.

When the head appeared at the vulva a piece of gauze soaked in the bichloride solution was applied and kept there. After the expulsion of the child the genitals were kept covered by a similar compress. The placenta was expressed by Credé's method, so that it might not be necessary to introduce the finger inside the vulva. If it was necessary to introduce the finger to remove placenta or membrane the vagina was washed out, otherwise not.

Intra-uterine injections were used only when the hand or instruments were introduced into the cavity of the uterus, or after the birth of a macerated child. After the expulsion of the placenta the vulva and adjacent parts were washed out with the solution and the vulva covered with a large gauze compress wet with the solution. Before each washing the nurses disinfected their hands as before labor. No vaginal injections were used except in fetid lochia. Every substance brought in contact with the genitals was soaked beforehand in the solution.

There are some of you who may remember the ridicule or skepticism that greeted the announcement of these measures; there are many more of you who remember how the pestilence gathered its terrors to itself and fled away in a night—and it has never returned.

On December 21, less than three months later, Garrigues, in reporting the result of his work, was able to say: "The effect of the treatment has been wonderful. As if by magic all trouble disappeared. Ninety-seven women have been delivered since its introduction and not only has none of them died, but there has scarcely been any disease among them—only three had any rise of temperature. The pavilions are scarcely recognizable. Where we used to have offensive odors, feverish, prostrated, or despairing patients, overworked nurses, and despondent doctors, the air is pure, the patients look well, their temperatures are normal, the nurses are cheerful, and the doctors happy."

Could there be a greater triumph than this? Was ever a greater lesson taught more quietly? What battle of the greatest general of the world's red fields was ever fraught with consequences more momentous?

The lesson was taught to the world, and the world has heeded it well, for even today we acknowledge its influence. "Peace hath its victories far more than war," yet we do not beat the drums when lives are saved, or sound the bugles when disease is made to flee. The world has ever held him the hero who has led victorious armies in triumph across fields strewn with dead and dying men. Is he less worthy to be called a hero who has been victorious in his battles against the legions of death?

Garrigues, the man who saved and taught us how to save the mothers of men, lives to know we know the value of his deed; lives to know the place of honor he holds in the hearts of his fellows; lives in the pulsing blood of happy wives and mothers, and has an immortality in thousands yet unborn.

DISCUSSION.

Dr. Robert A. Murray.—I can add very little to the eloquent oration which Dr. Wells has just delivered. I was a colleague of Dr. Garrigues, and saw his work. I was very proud to be his colleague, and I know what the condition of the Maternity was and how it was transformed; how he got his colleagues to work with him. But he had a public institution to deal with, and the Board of Commissioners supplied us with the means; and it was only by his very great industry and his very great power in showing that what he endeavored to do would also decrease the expense, that we were enabled to get the means to do what we did. The great cause of trouble in this institution was puerperal infection. We did not have the means, and until the death rate compelled us to start and ask the Commissioners for the means,

we did not get the opportunity to do what Dr. Garrigues so well introduced. But it was proved absolutely that financially it was a very great opportunity to do good work when we had the means of doing it. Before this, if a woman was delivered by the interne there was no certainty that infection had not been produced. We had no means of preventing it. If the nurses made an examination of the patients, we had not the slightest certainty that we would not have another epidemic introduced. We could not enforce what should have been tried, namely, to enforce rules for absolute cleanliness. We could not do that, and we were supplied with poor material. Fortunately, at that time, Garrigues rose to the occasion and said, "We must have a change." Coincident with the change in the staff, we were able to institute measures to change the whole treatment. Dr. Garrigues, in carrying it out, had a great deal of ridicule thrown on him on account of his inclination to be so thorough. When we have serious dangers to combat, we have got to have radical measures. We had to have patients covered and kept covered from the moment labor began until delivery and afterward. We had to do that, or we were never certain the patients were not poisoned. Dr. Garrigues was instrumental in showing to his colleagues that he would have to be radical; and while many of his colleagues have departed somewhat from the radical character of the treatment, yet on occasions when we have epidemics, we will soon see that the doctor did not overstep the mark, nor make too hard or exacting the treatment to prevent puerperal infection.

I am exceedingly glad to have this opportunity to add my word in honor of my colleague and, to a certain extent, my master in obstetrics. (Applause.)

Dr. Egbert H. Grandin.—It is an honor for me to speak to my old friend, colleague, and teacher on this occasion. Fresh from Boston, the home of Oliver Wendell Holmes, the predecessor of Semmelweiss; fresh from Paris, a student under Tarnier; fresh from Vienna, where I studied under Karl Braun, Spaeth, Welpouer, and Schauta; fresh from such scenes where the mortality rate from septicemia reached 30 per cent. and the morbidity rate was 95 per cent., I became associated with Dr. Garrigues, on the staff of the New York Maternity Hospital, and

it was a revelation to me that he alone had accomplished so much in the face of ridicule. He had brought the mortality rate to within a fraction of 1 per cent., and the morbidity rate to nil! It is the fortune of the average medical man to be abused; it is rarely his fortune during life to be praised. We honor ourselves, Mr. President, in honoring Dr. Garrigues; we honor our specialty in honoring him, for were he not so modest he might exclaim with old Horace: "I have builded unto myself a monument more lasting than brass."

As you round out your years, sir, and fill your appointed term, among your pleasantest memories may this occasion be, so full, as it is, of esteem for you. You are one of the men whom future generations of women shall rise up and call blessed; and when your summons comes, and you pass through the golden gate—which may not be as mythical as some think—perchance the angels themselves will fall down and call you blessed, while, as you "see your Pilot face to face," you hear from Him, as you do now from your colleagues, the words, "Well done, thou good and faithful servant!" (Applause.)

Dr. William M. Polk.—In December, 1864, on a bright cool morning, I took my way across the battlefield to Franklin, and as I approached the line of works I found it was with difficulty I could tread upon the ground without touching the dead.

About five years later I found myself an interne in the Lying-in service of Bellevue Hospital.

In the spring of 1870 there sprang upon all surgical work a wave of sepsis, which practically engulfed every piece of work that had traumatism as its associate. Sixty cases of confinement a month was then the record of that institution, and as I went on duty May 1, 1870, I found every bed filled with a septic case, and as I advanced into the service, as I shifted to the dead-house those who had been there upon my entrance, I merely put in their places others, stricken as fatally as those whom I had originally found in their places, so that out of 60 cases of confinement which fell to my share during that month, 45 passed into the dead-house, and of that number only 2 died of causes other than sepsis. Is it any wonder that, as Dr. Wells spoke of the glories that came from one species of destruction, and the glory which came from the checking of another species of destruction, these

two experiences were placed side by side in my mind, and that I should find myself in more than hearty accord with the eloquent words which he has pronounced upon the beneficent action of our Fellow?

It is easy, Mr. President, upon occasions like this, to ramble in the realm of sentiment; to gather from one's own experience or that of others words of praise to be uttered on these occasions; but it is too sacred an occasion to be dropped to such a level. We are here as representatives of one of the first medical subjects that has engaged the attention of men. We are here today to do honor to one who did more than any other living member of this Society to make effective, to make glorious, the labors upon which we are engaged, and in doing so we draw to ourselves the helpful thought that it has been done of us; that it belongs to us; it is a part and parcel of the labor that we have been engaged in, and we are thankful that so fine a personality could have accomplished the great purpose which this man did. It is not worth while to go back over the ground covered by the various discussions which sprang up in reference to the way to handle this particular malady. It is only worth while for us to bear in mind that there comes an occasion in every man's life when it is necessary for him to face perhaps the unknown. Our profession, our calling, has one great thing in its favor, and that is, it is a mine of work from which can be extracted, in unknown fields, great rewards by those who have the courage, by those who have the education, by those who have the persistence to exploit them. When, therefore, we come to contemplate the work that has been accomplished by our Fellow, we can only find in it a stimulus to go forward and do the work as well. Mark you, "as well."

When I come to an occasion of this kind; when I find moral excellence reaching the plane it has in the person of this man, I feel that I would be recreant to this Society, I would be recreant to this opportunity, if I did not say to you and prove to you, as it can be readily done, that out of truth, out of honesty, as well as out of courage, comes the success in this life which enables its possessor to look squarely in the face not only pleasures, but all of the evils which may possibly befall us. If any greater prize can come to a human being than that, I fail to know it.

Dr. H. J. Garrigues.—The younger members of this Society will doubtless have been much surprised when they saw in the program of this meeting that there would be "a special oration to me in appreciation of my work in introducing asepsis into obstetric practice." They will have asked themselves, "What has that man done to deserve so distinguished an honor?" What little merit I have in this connection lies so far back that a whole generation of physicians has had time to be born and graduate and practise obstetrics. They have not known other conditions surrounding child-birth than the blessings of antiseptic and aseptic midwifery, to which, perhaps, they owe their very existence. They can hardly form any idea of the difficulties with which we had to contend before their time.

Dr. Wells has so fully described to you the conditions in Maternity Hospital, and the details of my work, that I have nothing to add. I will only say that as soon as I had reported the treatment and its effect to the Medical Society of the County of New York, it was adopted by your late fellow-member, Dr. Lusk, in Emergency Hospital, New York, and Dr. Richardson, in Boston, and they obtaining similar results, the new method spread rapidly over the whole country.

Fellow-members of the American Gynecological Society, I ask you to accept my heartfelt thanks for your great kindness in commemorating my work at the New York Maternity Hospital, and I thank especially Dr. Wells for having brought up the subject, and the other members of the Society who joined him with their commentaries.

Thirty-two years have elapsed since I landed as an unknown foreigner on these shores. That I was admitted to your scientific societies and placed in a position where it became possible for me to contribute to the reform of American obstetrics, I owe largely to members of this Society, who are no longer in our midst. I seize this occasion to gratefully recognize what Marion Sims, Fordyce Barker, Emil Noeggerath, Theodore Gaillard Thomas, Paul F. Mundé, and James R. Chadwick did to smooth the way for the newcomer.

Fellow-members, accept my thanks and allow me to remember the departed.

RADIOGRAPHIC DIAGNOSIS OF RENAL LESIONS.

By Lewis Gregory Cole, M.D.,
New York.

Since the more general practice of nephrotomy has demonstrated the difficulty of diagnosticating cases of renal calculi with any degree of certainty, the demand for a more positive method has been apparent, and the discovery of Röntgen, twelve years ago, was at once eagerly seized upon as furnishing this method.

Radiographs of favorable subjects were made showing these lesions, and reports of these cases were heralded around the world creating in the minds of the oversanguine the erroneous impression that the *x*-rays furnished a simple and infallible solution of the problem.

With the generally limited knowledge of the science then possessed, physicians, surgeons, and instrument-makers at once provided themselves with *x*-ray equipments and undertook to make radiographs of renal calculi with what would now be regarded as crude apparatus.

As a result radiographs were made giving shadows which were interpreted as calculi, but which in many cases were not sufficiently distinct to justify a positive diagnosis, and in none of these early plates was there sufficient detail to warrant a negative diagnosis. Such diagnoses were, however, frequently made, and in many cases proved erroneous, with the result that this method fell into disrepute and it is with considerable difficulty that it is becoming reinstated in its proper place.

Three years ago this spring, after making a number of satisfactory radiographs of the renal and ureteral region, I read a paper before the Genito-urinary Section of the New York Academy on "The Negative and Positive Diagnosis of Renal and Ureteral Calculi by the Ray of Selective Absorption," and demonstrated some plates which showed calculi distinctly where the diagnosis had been verified by operation, and others which showed the psoas muscle and the tips of the spinous process distinctly enough to justify a negative diagnosis.

In some of these cases the symptoms of renal calculi were so characteristic that the operation was performed, and in only one case was a stone found that was not shown in the radiograph, and in that case the plate did not extend high enough up to include the area of the pelvis of the kidney, where the stone was found on operation.

This success continued until the two tubes I was using gave out, and with new tubes the results were not nearly so satisfactory, and for several months it was with great difficulty that I obtained radiographs with sufficient detail to justify a negative diagnosis.

During the winters of 1904 and 1905 I devoted much time to experimental work on the ray of selective absorption and the results of this line of work are fully described in the *Archives of Röntgen Ray*, May, 1905, and further experiments along the same line in the *Archives of Physiological Therapy*, and in the *Transactions of the American Röntgen Ray Society*. In brief, this resulted in the separation of the *x*-rays into three distinct varieties: (1) the direct rays; (2) the indirect rays; (3) the secondary or sagnyac rays.

The purely direct rays, when they can be obtained, give, on a well-timed and properly developed plate, the greatest amount of detail; not only the structure of the bones, but the muscles, fasciæ, fat, and even the blood in the veins show very distinctly.

The indirect rays from the average tube are equally as powerful and abundant as the direct rays, and their effect is simply to fog the plate and obscure the detail of the direct rays. It has been demonstrated by Prof. J. J. Thomson that the secondary or sagnyac rays are generated in and emanate from all substances under the action of the *x*-rays in inverse proportion to the density of the substance, and I am convinced by my own experiments that they are produced to a greater extent by the indirect than by the direct rays, and the effect upon the plate is detrimental in the same manner as the indirect rays.

Compression Blend. The use of a diaphragm, or compression blend, cuts off the indirect rays to some extent and helps very materially in obtaining good radiographs of the renal and ureteral region, but it does not convert any greater percentage of the energy into direct rays.

With an apparatus so constructed that you have a preponderance of direct rays, and using a compression blend to eliminate the indirect rays and limit the field in which the secondary rays are generated, we can obtain enough detail to enable one to make a negative or positive diagnosis of renal or ureteral calculi of sufficient size to justify an operation.

Technique. The patient should be prepared for the radiograph by thorough cathartics the night previous and an enema just before the exposure is made. This is especially important when the patient is constipated and the stools are hard and dry. The bladder should also be empty.

Diet. It is desirable that only a light breakfast should be eaten and that the stomach should be empty before the radiograph is made.

Clothing. The clothing should be removed from the part of the body to be radiographed; not that the clothing interferes so much with the rays, but they are likely to contain buttons, hooks and eyes, or pins, that might lead to a misinterpretation of the negative.

Position. The patient then lies with his back flat on the table and the thighs flexed so that the small of the back is in contact with the plate. Raising the head or shoulders sometimes assists in securing this position.

Large Plate for Genito-urinary Tract. If one large plate is to be used to include both kidneys, both ureters, and bladder, the tube is placed vertically over the umbilicus, twenty or twenty-two inches from the plate.

Size of Plate. An eleven- by fourteen-inch plate is the smallest size that will include both kidneys, ureters, and bladder, and if the patient is tall this is not large enough. Just previous to adjusting the plate under the patient it is well to test the tube. As the kidney moves from one-half to two inches during respiration, the patient should hold his breath during the exposure, otherwise the shadow of a calculus will appear ill-defined and indistinct and, if very small, will appear as a blurred line.

Exposure. The time of exposure varies from ten to thirty seconds, according to the size of the patient and condition of the tube. The radiograph should include the eleventh and twelfth vertebræ and ribs above and extend about one inch beyond the tip of the coccyx below.

Compression Blend. Much more detail may be shown when a compression blend or diaphragm is used. The compression blend not only compresses the parts and holds the patient quiet, but it also prevents to a large degree abdominal breathing. At the same time it so limits the area exposed that its use requires five radiographs to show the entire genito-urinary tract, one for each kidney and the upper part of the ureter, one for each ureter, and one for the bladder and lower part of each ureter.

Renal. The radiograph of the kidney region should show the eleventh and twelfth ribs and the first, second, and third vertebræ (lumbar).

Ureteral. The ureteral radiographs extend from the third lumbar vertebra to the brim of the pelvis.

Bladder. The radiograph of the pelvis includes the pubis below and extends up as far as possible.

Full Set of Plates. The necessity of making a full set of plates cannot be too strongly urged. An oculist would not limit his examination to one eye, or an aurist to one ear, nor would a diagnostician make a physical examination of one side of the chest, even although all the pain was on that side. Why should a radiographer make a radiograph of one kidney?

In a number of cases which I will mention later, calculi have been shown on the opposite side from which the pain occurred, or calculi have been present on both sides and only given symptoms on one. If an opinion is desired as to the size, shape, position, and density of the kidney, then surely a radiograph of both kidneys is necessary for comparison.

Interpretation of Plates. The interpretation of the plate is more important and more difficult than making it, and lack of care and experience in this is the cause of most of the errors that have been made in the diagnosis of renal and ureteral calculi by the *x*-rays.

A person unfamiliar with wood-craft is astonished at the way an old hunter can follow the track of an animal in the woods, yet when his attention is called to the barking of a fallen log, the slight imprint in the ground, the turned leaf, or broken twigs, etc., they are all apparent. It is much the same in reading *x*-ray plates; the shadows are there, and anyone can see them when they are pointed out.

It requires a careful study and comparison with other plates by a trained eye to detect slight shadows, and it requires experience to determine whether they are due to calculi or one of many other things which I will mention later. This has been especially impressed upon me during the preparation of this paper, when I have studied nearly fifteen hundred

plates, made during my practice, some of the earlier ones showing shadows of what I then failed to recognize as possible calculi, requiring repeated exposures for verification.

It is unwise to make a diagnosis on a wet plate; drops of water and the glistening of the wet surface interfere with the detail. The plate should be allowed to dry slowly and the back of the plate thoroughly cleansed and polished. It should then be carefully studied and compared with other plates in a good, even light. Some prefer an illuminating box where the light can be controlled with a rheostat, but personally I prefer a Northern sky or day light with a ground glass, holding the plate in my hands so that it may be tilted at different angles to show finer gradations of the shadow.

One is not justified in making a negative diagnosis of renal or ureteral calculus unless a plate of the renal region shows the following detail:

1. The spine and transverse processes should show distinctly all the way to the tip.

2. The outer border of the psoas muscle must show. In some very flabby, fat patients it may not show as distinctly as the kidneys.

3. The eleventh and twelfth ribs should show distinctly, and in many cases the bony detail may be distinctly seen.

4. In about 75 per cent. of the cases the kidney may be seen more or less distinctly, and if special care in technique is used, it may be shown in nearly every case.

5. The liver is frequently seen, and at times it interferes with showing the convex surface of the upper pole of the right kidney.

6. The spleen also may be seen, especially if it is enlarged or congested.

7. Accumulation of gases in the colon and small intestines appear on circumscribed areas, and folds in the walls of the intestines are often seen traversing these areas.

8. Feces in the intestines, especially in the colon, show very

distinctly (Cook) and interfere very materially with the diagnosis of renal lesions.

Ureteral. The plate of the ureteral region should include the third, fourth, and fifth lumbar vertebræ, and part of the sacrum and ilium. The bony detail should show distinctly, and the sacro-iliac synchondrosis should be well defined. The outer border of the psoas muscle is clear, and the accumulation of gas and feces are frequently seen in the cecum or sigmoid. The course of the ureter is about on a line with the tips of the transverse processes, and at the sacro-iliac synchondrosis. Calcified arteries are sometimes seen in the plates.

Pelvis. This plate shows the pubes, the bony structure of the spine of the ischium, the sacrum, and the coccyx all the way to the tip. The bladder distended with urine is sometimes well marked, also when injected with silver solution.

Diagnosis. Up to the present time the radiographic diagnosis of the genito-urinary tract has largely been limited to the negative or positive diagnosis of renal, ureteral, or vascular calculi. We will therefore consider this subject first.

After having made and carefully studied about fifteen hundred plates of the genito-urinary tract in about five hundred cases, I believe that a plate having the above-described detail will show any variety of renal, ureteral, or vascular calculi of sufficient size to justify an operation—that is, one that is too large to pass.

In view of the fact that some of the best authorities disagree with me in this statement, it is with reluctance that I make it; but after carefully experimenting with the softest calculi that I could obtain, and in one case using the very stone it was claimed would not show, I am convinced that I am justified in making this statement. I placed the stone behind a patient and made an exposure, and it showed very distinctly. This, of course, is much easier than if it were in the kidney.

I then placed it on the abdomen of a large man and it showed distinctly. This was much more difficult than showing it in the kidney, because the farther the calculus is from the plate the less distinct it is. Not satisfied with this, I embedded this calculus in paraffin and placed it behind a patient the same distance from the plate that it would be if it were in the kidney, and it showed distinctly.

In some cases the calculi are so distinct that there is no difficulty in making the diagnosis. In others, however, it requires the careful study of several confirmatory plates to differentiate between calculi and the following:

1. Fecal concretions.
2. Gallstones.
3. Calcified costal cartilages of the eighth and ninth ribs.
4. Spiculæ of the bone.
5. Small calcareous bodies, or so-called phleboliths.
6. Folds of intestines.
7. Enteroliths.
8. Foreign bodies in intestines.
9. Calcified arteries.
10. Calcified lymph nodes.
11. Prostatic calculi.
12. Finger marks.
13. Developing stains from uneven flood of developer.
14. Flaws in plates.
15. Tuberculous kidney.
16. Shot in back.
17. Unknown.

1. We are most frequently called upon to differentiate between the shadows of calculi and those of fecal concretions, and it is unwise to make this differentiation on one plate:

Calculus.	*Fecal Concretions.*
If the patient has held his breath, the edges of the calculus will appear clear-cut and well defined. The shadows are more dense for their size, and are only seen in the region of the kidney or ureter, and the most important thing is to give time for fecal concretions to move out of the field or change position, and if the shadow remains in the same place it is not fecal concretion.	The edges of the shadows are ill-defined, and the shadows less dense than that of calculi of the same size. They are usually multiple and at least some are not in the region of the kidney or ureter, and if time is allowed to elapse between exposures and a cathartic and enema are given, the concretion changes its place or disappears entirely.
	Glazier, Cook.

2. Gallstones. Gallstones may be shown with patient on back, but are more clearly defined when patient lies with abdomen flat on the plate. The reverse is true of renal calculi. Shifting the tube slightly changes the position of the shadow of the gallstone more than it does the shadow of the kidney stone.

3. Calcified Costal Cartilage of the Eighth and Ninth Ribs. The calcified costal cartilages of the eighth and ninth ribs resemble renal calculi very closely. They may appear in the kidney in the same positions in repeated exposures. There is usually more than one area, which gives the appearance of a calcareous deposit throughout the kidney, more than an isolated calculus or two or three calculi, and they are usually bilateral. They may be definitely differentiated from calculi by having the lip of the compression blend under the free border of the ribs; therefore, whenever the shape of a person is such that the compression blend must be on top of the free border of the ribs in order to include the renal region, these shadows must be differentiated from calculi.

4. Osteoplaque or Spicula of the Bones. In cases of osteo-arthritis of the vertebræ resembling ureteral calculi, they are a trifle nearer the spine than the normal course of

the ureter, and the other changes of the spine, such as lipping and destruction of the cartilages, are always present.

5. Small Calcareous Bodies, or So-called Phlebolithis:

Calculus.	*Calcified Bodies.*
Usually single and only on one side. If multiple they are arranged in lines which correspond with the course of the ureter, usually are irregular, and have rough edges. If they are round, or small with rough edges, they change position between exposures, with attacks of renal colic and blood in urine. They must be in line with the course of the ureter.	Calcified bodies near the lower end of ureter usually are multiple and on both sides. When multiple they are arranged in a line running in the opposite direction to the course of the ureter. They are round with smooth edges, and so small that were they calculi they would pass or change position between exposures. Usually they are one-fourth to three-fourths of an inch to the outer side of the ureter.

Ureteral catheterization, which is discussed later, aids very materially in differentiating these conditions.

6. Folds of Intestines. These are not as well defined as calculi; usually seen accompanied only by accumulation of gas, and appear as long, narrow shadows instead of the shape of calculi. Unless the fold is permanent and held in place by adhesions, it does not appear in confirmatory plates.

7 and 8. Enteroliths and Foreign Bodies. Enteroliths and foreign bodies change their position. A Murphy button in the stomach viewed edgewise might readily be taken for a large calculus, but sooner or later it would show the hole in the centre.

9. Calcified Arteries. Calcified arteries usually show the form of the artery, and are not in the position of the kidney or ureter.

10. Calcified Lymph Nodes. Calcified lymph glands, especially those in the pelvis, resemble calculi very much. They usually, however, are multiple and not in line with the normal course of the ureter.

11. Prostatic Calculi. Prostatic calculi are farther down than ureteral or vascular calculi, and more closely resemble phleboliths.

12. Finger Marks. Finger marks during developing of the plates might readily be mistaken for stone.

13. Developing Stains from Uneven Flood of the Developer. Irregular flooding of the plates during developing may leave a small area that resembles a stone.

14. Flaws in Plates. Slight flaws in plates have come as near causing me to make an error as anything I have seen. The case I have in mind appeared as a small, well-defined, round shadow with clear-cut edges, exactly in the line of the ureter and about the place the patient had complained of the greatest pain. Up to this time I had only made confirmatory plates in doubtful cases, and this did not appear to be a doubtful case, but fortunately a confirmatory plate was made and the spot had disappeared, and on closer study you could see it was a flaw in the plate.

16. Shot in Back. Shot in the muscles of the back are more distinct and the edges more clear-cut than calculi.

Aside from these possible mistakes we find well-defined permanent lesions which I have been unable to diagnosticate, and some of these plates I will show.

X-rays versus Exploratory. Anyone who has hunted for a needle in a finger, even after a radiograph has shown its presence and apparently its exact position, realizes how difficult it is to find a foreign body. The finger is much smaller than the kidney, there is nothing to prevent cutting in all directions, hemorrhages may be prevented, and all the circumstances most favorable, yet few persons except radiographers know how prolonged and unsuccessful the operations for foreign bodies frequently are. How often you hear this phrase: "The *x*-rays showed a stone, but none was found on operation." No one would question for a minute the fallacy of the exploratory operation, especially if the kidney

was split and the calices explored with the finger. The following cases would show the relative value of *x*-rays and exploratory:

The writer radiographed a case and made a diagnosis of five calculi, a large one in the pelvis and four small ones apparently in the calices, and an operation was performed by a very careful surgeon. The kidney was split and the large stone was found. A thorough search was made by the surgeon and his assistant for the small ones. The calices were explored with the finger of each of the operators. Assuming that the nodules on the calculus were what had been interpreted as four small calculi, they informed me that my diagnosis on the large calculus was all right, but that there were no small ones present. About six weeks later the patient had a severe attack of renal colic and passed four of the largest stones that could possibly pass. The large stone was in such a position that the small ones could not possibly have slipped past into the ureter before or during the operation.

A number of cases are on record where the calculus has been shown in radiographs and not been found on operation, but later the diagnosis has been verified by removal of the kidney, when the calculus has been found. Are the surgeons justified in saying that the calculi are not present after an exploratory operation, when a satisfactory radiographic examination and positive diagnosis have been made?

Catheterization versus *X*-rays in the Diagnosis of Renal and Ureteral Calculi. Comparing the relative value of catheterization and *x*-rays, so much depends on the technique of the one and the dexterity with which the other is performed, that we will only compare the results of the best of each. Each has its dangers.

In *x*-rays there is the danger of the so-called burn, but with the short exposures of thirty to fifty seconds this is practically eliminated. The danger of infection and shock from ureteral

catheterization you are in a position to know better than I am; and the discomfort, to say the least—well, the patients are the best judges of that, and most of them have had very decided views on this subject.

As to their value, each has its place. Many things can be determined with the catheter that cannot be with the *x*-rays, but in the diagnosis of renal calculus, if you cannot find a stone in the kidney when it is split open by examining each calix with your finger, how do you expect to make a negative diagnosis of calculus at the other end of a catheter sixteen inches long? And with what certainty can one say that he touches a stone in the pelvis of the kidney? In the diagnosis of ureteral calculi the catheter is of more value than in renal, as one can say with certainty that he meets with an obstruction so far from the bladder, and, with wax tips or other devices, in some cases may be reasonably sure it is a stone, but whether it is small or large, smooth or rough, and whether it will move or not, it is impossible to say.

A radiograph will show the size, shape, position, and with a little experience one can tell whether they will pass or not. A small, rough one will lodge, while a smooth one of astonishing size will pass. On the other hand, small calcified bodies near the lower ends of the ureters, called by many phleboliths, are frequently mistaken for calculi. The characteristic differences between these are described early in this paper, but a combination of catheterization and *x*-rays is of greatest value, using a styleted catheter and making a radiograph.

As I said, these phleboliths are usually about one-half to three-fourths of an inch to the outer side of the course of the ureters, but sometimes directly in line with the ureters, and in the *x*-rays appear to lie against the catheter. It is wise to make two radiographs at different angles, to prevent this source of error.

Do Calculi Perforate or Migrate through the Walls of the Ureter? The first case of ureteral cal-

culus that I radiographed showed a well-marked shadow near the lower end of the ureter, oval in shape and about 1 cm. long. It appeared in several plates. Ureteral catheterization showed no obstruction at this point. An exploratory operation was performed, and on palpation no calculus could be felt. The ureter was opened and a catheter was passed into the bladder without meeting with an obstruction. At that time I was not familiar with so-called phleboliths, and insisted there must be a calculus, so just before closing the wound a further search was made and the calculus was found in a pocket it had formed in the ureter just before it passes into the bladder. It was pushed out of the pocket into the ureter and out of the opening near the kidney.

In another case a calculus was found to be embedded in the walls of the ureter, and Dr. Keyes told me of a case where a stone containing urinary salts was found in the abdominal cavity. In another case the catheter met with an obstruction about one and one-half inches from the ureteral orifice. The case was radiographed, at the patient's request, to ascertain the size and shape of the stone and the possibility of its passing. No calculus was shown at this point, but there was a well-defined one in the kidney.

One of the most important points that the writer has to make is: That many of the cases having typical attacks of renal colic do not have a stone in any part of the genito-urinary tract, and when a calculus is shown it is usually so small that it will pass without an operation other than ureteral catheterization.

On the other hand, only a few cases in which renal calculi have been demonstrated by *x*-rays have had symptoms that were sufficiently characteristic to justify an operation, and of those few only those that engage in the ureter or obstruct the pelvis cause typical renal colic. They may have pain either in the back or side, especially on jolting or riding in a car, tenderness over the kidney, dull aching, or especially what is

described by them as a sense of weight or heavy feeling in the back.

A great many of the cases diagnosticated as lumbago or rheumatism of the back have renal calculi. Whether the calculus is the cause of the lumbago, or the lumbago the cause of the calculus, is not for me to decide.

Calculi giving symptoms of chronic appendicitis are very common. Several of the cases in which calculi have been demonstrated were diagnosticated as appendicitis, and radiographs have been made just to eliminate the possibility of calculus. This has occurred in so many cases that some physicians are having nearly all cases of obscure abdominal lesions radiographed. The wisdom of this is particularly shown in the following cases:

A woman, aged fifty years, complained of symptoms which were diagnosticated as appendicitis (chronic). She travelled a great deal both in this country and abroad, and her hobby was to get the opinion of the best authorities in every country, and, strange as it may seem, they nearly all agreed that it was appendicitis in some form or another. She finally came under the care of a physician who had many of his obscure abdominal lesions radiographed, particularly those of appendicitis, to differentiate them from renal calculi. This case had a stone in the pelvis of the kidney, and repeated urinary analyses had given no indication of stone.

Ten or eleven of the 54 cases in which I have demonstrated renal calculi have complained of all the pain or the most severe pain on the opposite side from that on which the calculus was found. This is such a peculiar fact, requiring a detailed history of each case to make it complete, that it seems unwise to incorporate it in this paper; I therefore merely mention it here to show the necessity of making radiographs of both sides.

Besides making a positive or negative diagnosis of renal or ureteral calculi, much information may be gained by a radio-

graph having sufficient detail to show the kidney distinctly. The density, shape, size, and position may help very materially in making the diagnosis of tuberculosis, new-growth, prolapse and congestion of the kidney, and ascertaining the presence of the kidney on the opposite side.

The kidney may be seen more or less distinctly in about 75 per cent. of the cases, and if special care in technique and selection of tubes is used it may be shown in nearly every case. Strange as it may seem, the size of the patient has very little influence; indeed, in large, fat persons it is more frequently seen than in thin ones. This may be accounted for by difference in density between the kidney and fat it is embedded in; the more fat, the greater this difference is. The soft tissues of some patients are much more dense to the rays than others, and where this is so the kidney shows very distinctly compared with the spine, which in these cases shows indistinctly.

The repeated appearance of one kidney and not the other, or the increased density of one compared with the other, or with the psoas muscle, indicates a change in the kidney, and if this density is uniform and the kidney is not mottled, it is due, probably, to congestion of that organ. If the kidney appears mottled or of irregular density, it would indicate tuberculosis or new-growth, and if the contour of the kidney is changed in addition to the irregularities of density and mottleness, it increases the probability of a new-growth. Several confirmatory plates are necessary, and these shadows must be differentiated from calculi and particularly fecal accumulations.

Size. The size of the kidney compared with the opposite one may be fairly accurately determined, but it must be remembered that it is slightly enlarged in the radiograph. The amount of this depends on the distance of the *x*-ray tube from the kidney and the distance of the kidney from the plate. In a person of ordinary size, with the tube eighteen inches from

the plate, the radiograph represents the kidney about one-half to three-quarters of an inch larger than it really is. In some cases the pelvis of the kidney and the ureter show distinctly, but it is doubtful if this is of any pathological significance unless it is thickened and irregular, which would indicate tuberculosis.

The position of the kidney at the time the radiograph is made may be demonstrated very accurately if the position of the tube is considered. If the kidney is shown to be out of place, the diagnosis of floating kidney is positive, but if it is shown to be in its normal place it does not indicate that it is not movable, as the position of the patient and particularly the pressure of the compression blend tend to cause it to assume its normal position.

Resume. The principal points that should be remembered are:

With a limited knowledge of the science, radiographs have been made which did not have sufficient detail to justify a negative or positive diagnosis, and persons without sufficient experience have made negative or positive diagnosis on these plates.

The separation of the *x*-rays into three varieties. The value of the direct in radiography and the detrimental effect of the indirect and secondary.

The interpretation of the plate is more important and more difficult than making it.

The amount of detail necessary for a negative diagnosis.

Technique, diet, clothing, catharsis, position, exposure, etc.

Necessity of making full set of plates.

Reasons for believing that one is justified in making a negative diagnosis of calculus when above-described detail is present.

Things calculi must be differentiated from.

X-rays *versus* exploratory in the diagnosis of calculi.

X-rays *versus* ureteral catheterization in the diagnosis of calculi.

Most cases having typical attacks of renal colic do not have stones, and, on the other hand, only very few of the cases which have calculi have symptoms sufficiently characteristic to justify an operation.

Similarity of symptoms of chronic appendicitis and renal and ureteral calculi.

About one-quarter of the cases in which calculi are found have the most pain on the opposite side.

Value of the *x*-rays in the diagnosis of tuberculosis, new-growths, and nephroptosis.

One cannot expect any great amount of success in renal radiography when work requiring so much attention to detail is turned over to hospital orderlies, nurses, or even physicians who are without training and experience along this line.

DIAGNOSIS AND TREATMENT OF CALCULI IN THE LOWER END OF THE URETER.

By Hugh H. Young, M.D.,
Baltimore.

Several years ago I had the interesting case of a man from the West Indies who had a constant daily aching pain in his rectum, the pain in the bladder radiating to the end of the penis, and occasionally radiating up to the kidney and sometimes to the testicle. After considering the description given by him very carefully, I told him I thought he had a stone in the lower end of the ureter which projected into the bladder, which obstructed urination and in a measure gave him his renal symptoms. I thought, too, that the stone might have impinged on the seminal vesicles, giving him the ejaculatory symptoms he had, and sufficiently close to the rectum to give him pain in that region. After returning to Baltimore with me he was cystoscoped, and a stone was found sticking out of the ureter, which was removed suprapubically.

Since then I have studied more carefully the anatomy of that region, and I think it is very plain that there is an anatomical explanation for such a group of symptoms as I have given. Taking this view here (indicating), you see the lower end of the ureter just before it enters the posterior surface of the bladder; it comes in contact with the upper portion of the seminal vesicles; the vas deferens hooks around it and is close to it. The rectum, in a distended state, lies immediately behind it, and a stone in that region is in communication

with the bladder and projects into it. You see the relation of these regions to the ureteral orifices; the seminal vesicle behind, the vas deferens hooking around it, and going to the testicle and bladder.

Since the case referred to I have had five or six others showing more or less all of that group of symptoms. In one case, which I saw recently, the stone was intramural.

Before proceeding further, I will say that stones in the ureter may be classified as intravesical, those projecting into the bladder either becoming encapsulated or with the end merely sticking out; or the intramural, in which the stone is in the bladder wall or juxtovesical, the stone immediately behind the bladder or adjacent to it. This second case I refer to had a stone in the intramural portion of the ureter something like this (indicating). The ureteral orifice was dilated; the stone was ½ cm. above the orifice; you could see it through the orifice of the ureter. The patient had pain in the bladder radiating down to the end of the penis during urination. He had severe pain during ejaculation. He had pain in the rectum, which was more severe when he became constipated. The probability is that in that case the pain in the seminal vesicle and rectum was caused by the pressure of the stone upon these two parts.

In another case, in which the stone was intramural, there was frequency of urination, pain during urination referred to the end of the penis, and also renal symptoms, but no rectal or ejaculatory symptoms.

In another case, in which the stone was a little farther up, just about 2 cm. above the bladder, the patient had no pain on urination; no pain during ejaculation; no pain in the rectum, but severe pain in his testicles. The stone was situated at a point in the ureter where it was crossed by the vas deferens. At the operation it seemed at that point, and I thought I could feel the vas deferens adherent to that portion of the ureter. At any rate, the pain in the testicle in that case was marked,

somewhat worse than in the preceding case. Another case similar to the above presented the same symptoms. I might refer to three other cases which presented the same symptoms as these others, but time will not permit.

As to the operative treatment of the intravesical form of calculi, I will say that they can be removed easily suprapubically. In one case I was able to tease out the stone by means of the ureteral catheter. In some cases the stone is situated so high up that it is necessary to do another operation. Through an extraperitoneal iliac incision the stone could be reached, pushed up the ureter, and removed through an incision higher up in the brim of the pelvis. I am able to report 8 cases in which the extraperitoneal operation was done in my practice, and 10 cases in the literature, with only 2 deaths, although it was said five years ago it was impossible to reach these calculi in the ureter.

SURGICAL CONDITIONS OF THE KIDNEYS.

WITH REPORT OF PERSONAL CASES.

By Charles H. Chetwood, M.D.,
New York.

The object of this report is to present a series of specimens illustrating various classified surgical conditions of the kidney, which specimens have been collected from cases personally operated upon.

A review of their clinical histories will serve to impress what is already known: That there is a wide departure from stereotyped lines in the symptomatology of many kidney cases, and that accurate diagnosis is possible only by careful preliminary study in each instance.

Chart I gives a general classification of the surgical maladies of the kidney, including: (1) acute infection of the kidney, or what is known as acute surgical kidney, represented in multiple foci or minute abscesses throughout the organ; (2) the more advanced condition of surgical kidney, pyelonephritis, being an inflammation involving the pelvis and parenchyma, and (3) the final condition of surgical kidney, pyonephrosis—nephritic abscess involving, more or less, the entire organ, often transforming it into a sac of pus.

When the same pathological conditions occur with the tuberculous element implanted thereon, corresponding to the multiple foci, we have miliary tubercles; instead of the ordinary pyelonephritis, tuberculous pyelonephritis, etc.

The same inflammatory conditions and a foreign body as the causative factor, or the presence of calculus or calculi, we define as the pyonephritic and pyonephrotic stone kidney; and in distinction from this composite condition is calculus in the kidney with none of the conditions attendant upon renal inflammation—lithiasis without infection. Also hydrops of the kidney, or hydronephrosis, caused by obstruction to the ureteral channel, and, finally, the neoplasms of the various types.

CHART I.—SURGICAL CONDITIONS OF THE KIDNEYS.

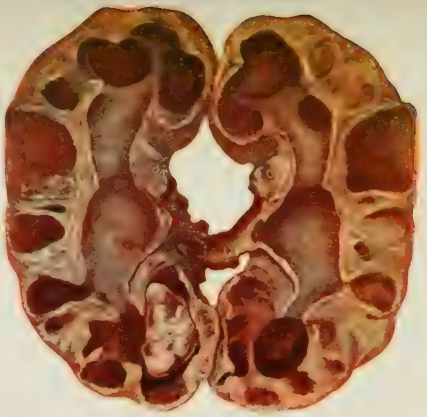
I. *Aseptic.*
   1. Neoplasms.
   2. Calculi.
   3. Nephroptosis.
   4. Ureteral obstructions { Hydronephrosis. / Passive congestion.
   5. Trauma { Rupture with severe hemorrhage. / Secondary inflammation.

II. *Septic.*
   1. Acute infection of kidney (multiple abscess foci).
      (*a*) Ascending.
      (*b*) Tuberculous.
      (*c*) Other hematogenous infections.
   2. Pyelitis and pyelonephritis.
      (*a*) Ascending.
      (*b*) Calculous.
      (*c*) Obstructive.
      (*d*) Tuberculous.
   3. Pyonephrosis.
      (*a*) Ascending.
      (*b*) Calculous.
      (*c*) Obstructive.
      (*d*) Tuberculous.

Chart II is a synopsis of cases reported, and contains a suggestive method of investigating cases and of keeping useful records.

The study of the symptomatology of different cases brings out the variation in symptoms and the importance of applying the different diagnostic methods for investigation, namely,

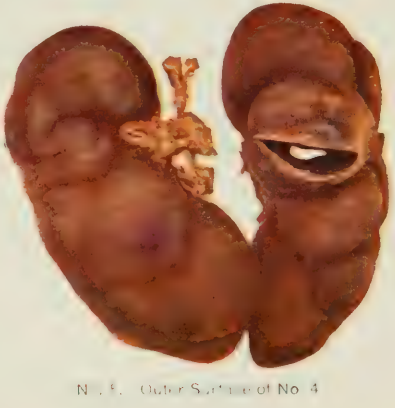
No. 1. Pyonephrotic Stone Kidney.



No. 2. Pyonephrotic Stone Kidney.

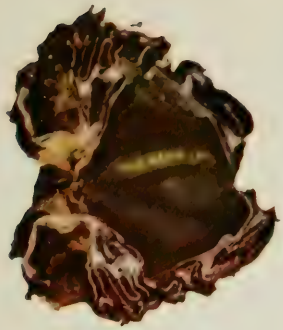
No. 3. Outer Surface of No. 2

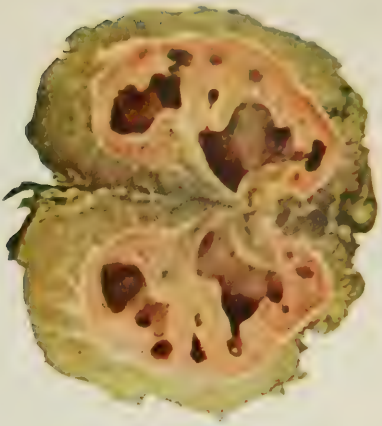
No. 4. Tuberculous Pyelonephritis.

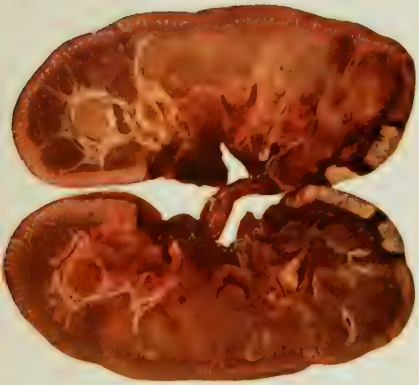


No. 5. Outer Surface of No. 4

No. 6. Tuberculous Kidney.







cystoscopy, radiography, and careful laboratory technique, by means of which we are enabled to make a rational interpretation of the existing symptoms and a precise localization of the suspected lesion, either by positive evidences or by a process of elimination, before resorting to operative measures.

CHART II.—SYNOPSIS OF CASES.

Condition.	Symptomatology.	Diagnosis.	Operation.
1. Renal lithiasis. Stone kidney without infection.	Pain. Hematuria. Urination.	Palpation. Cystoscopy. *X*-rays. Laboratory.	Nephrotomy or nephrectomy.
2. Renal lithiasis with infection. Pyonephritic stone kidney.	Pain. Hematuria Pyuria. Urination.	Palpation. Cystoscopy. *X*-rays. Laboratory.	Nephrotomy or nephrectomy.
3. Pyonephrotic stone kidney.	Pain. Hematuria. Pyuria Urination.	Palpation Cystoscopy. *X*-rays. Laboratory	Nephrotomy or nephrectomy.
4. Tuberculosis of the kidney	Pain. Hematuria. Pyuria. Urination.	Palpation. Cystoscopy. *X*-rays. Laboratory.	Nephrotomy or nephrectomy.
5. Trauma of the kidney.	Pain. Hematuria. Collapse.	Palpation. Exterior signs of injury.	Nephrotomy or nephrectomy.
6. Miscellaneous types simulating previous conditions.	Pain. Hematuria. Pyuria. Urination.	Palpation. Cystoscopy. *X*-rays. Laboratory	Exploratory. Nephrotomy.

Case I.—*Multiple Renal Calculi.* January 29, 1906; patient aged eighteen years.

Symptoms. (*a*) *Pain:* Complains of pain in the right lumbar region, which does not radiate toward the testis nor in any other direction. This pain is worse in the morning on waking; increases somewhat with exercise and after drinking alcoholic stimulants. The patient states he is free from pain in the afternoon and that it sometimes returns when he is

reclining in bed, but is never sufficient at this time to waken him. Hence the pain does not bear a direct relation to the muscular activity or rest of the body. The duration of the pain is thirteen years.

(*b*) *Hematuria:* The patient remembers having passed blood in the urine when he was very young, and again when he was about nine years old. He states that he has passed it about five times since then, and on each occasion about one-half cupful mixed with urine. Between times the urine has been perfectly clear.

(*c*) *Urination:* He urinates about every two hours by day, but does not rise at night; no increased frequency with exercise, no pain on urination.

Previous History. Denies venereal disease, and has never had night-sweats or protracted cough.

Family History. Father died from pulmonary hemorrhage alleged to have been brought on by drinking. Mother alive and healthy. Paternal grandfather had "asthma" and died from lung trouble. Two brothers died in early infancy, one having a severe cough. There are seven healthy children, including himself, living.

Physical Examination. Palpation negative; cystoscopy negative; *x*-rays negative.

Urinary Examination. Urine is practically clear; shows slight trace of albumin; acid; no epithelium; no pus; occasional blood cell; crystals of oxalate of lime.

Operation. February 2, 1906. Lumbar nephrolithotomy. Ten irregularly shaped stones are removed from the right kidney. Some are round, with flat bases, and others are jack-straw shape; weight, 70.77 grams; composition, uric acid and oxalate of lime. Patient makes an uneventful recovery and leaves the hospital at the end of ten days.

Remarks. The important features of this case are found in the preliminary history, which suggested either tuberculous or calculous kidney, and the negative *x*-ray diagnosis.

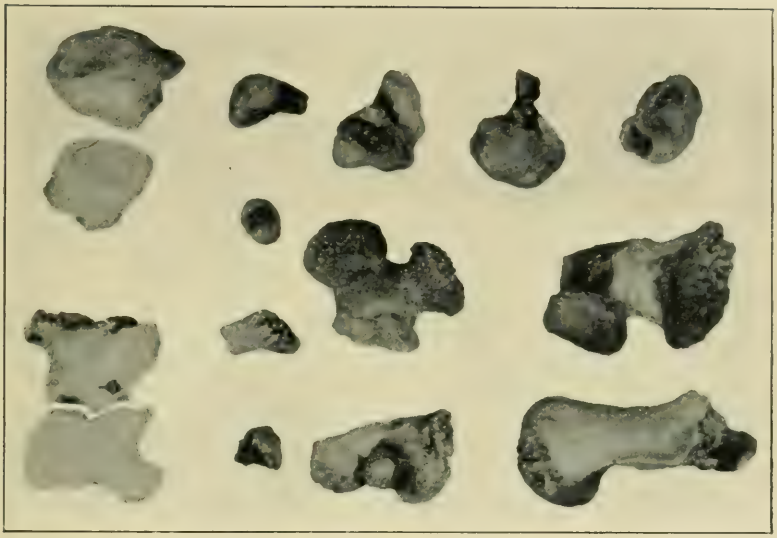


Fig. *a*.—Calculi from pelvis and calices of kidney.

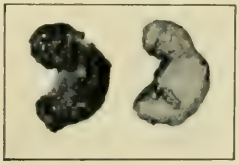


Fig. *b*.—Calculi from cellular tissue, outside of pelvis and ureter.

Case II.—*Pyonephritic Stone Kidney.* Patient aged forty-five years.

Symptoms. (*a*) *Pain* entirely associated with urination, which was frequent and difficult.

(*b*) No *hematuria;* marked pyuria.

(*c*) *Urination* every hour by day; two or three times by night. Fifteen years back, specific urethritis.

Physical Examination. Filiform stricture of the bulbomembranous junction. Urine freely purulent, forming bulky deposits; foul odor; some hyaline casts and normal urea output. No renal pain, palpation negative, patient being very fleshy.

Operation. Perineal urethrotomy. No reduction of pus in the urine followed operation.

Cystoscopy through perineal opening. Chronic cystitis; both ureteral orifices swollen. The urinary jet from right side distinctly cloudy. Field of vision quickly obscured. Left side showed nothing. No *x*-rays. Calculi not suspected.

Second Operation. Right kidney explored by lumbar incision. Kidney found enlarged and adherent, and presence of calculi recognized. The cortex was split and the stones removed, one by one, until twelve had been extracted, and two were found in the perirenal tissue, which had evidently migrated through the cortical surface. Patient made a good recovery. (See Figs. *a* and *b*.)

Remarks. Symptoms all vesical and urethral; no vesical pain or hematuria; palpation impossible. Diagnosis made by cystoscopy; *x*-rays not employed. Nephrotomy instead of nephrectomy, as, although the kidney was much damaged, there was no general septicemia, and the competency of the opposite kidney had not been satisfactorily established.

Case III.—*Pyonephrotic Stone Kidney.* (Fig. 1.) Patient aged forty years.

Symptoms. (*a*) *Pain* of dragging character in the right infracostal region, associated with movable body in the right

abdomen. Pain varied with the appearance and disappearance of movable body. Ten years previously operation had been performed and a small calculus removed from the right kidney; since when the pain has been as described, associated with the movable body.

(*b*) No *hematuria.*

(*c*) *Urination* slightly more frequent than normal. *Urine freely purulent;* contains bacteria and some albumin; urea output normal. Microscopically, cells from renal tubes seen.

Physical Examination. Right kidney palpable and usually movable; not markedly tender. *X*-ray picture reveals the presence of two stones, one involving almost the entire pelvis.

Operation. Kidney exposed and found to be little more than a pus sac containing stones. Nephrectomy.

Remarks. Symptoms distinctly renal; pain and pyuria. *X*-ray diagnosis positive. Cystoscopy not performed to estimate the opposite kidney, but on account of the showing of the urinary examination, together with the existence of nothing more than a pus sac on one side, the presumption of the competency of the opposite kidney is fairly established. Nephrectomy is performed both on account of the small remnant of kidney structure and in order to shorten convalescence, the patient being in bad general condition.

Case IV.—*Pyonephrotic Stone Kidney.* (Figs. 2 and 3.) Patient aged thirteen years; February 1, 1907.

Family History. Mother had never been considered strong; subject to colds of a protracted character.

Symptoms. (*a*) *Pain:* Present condition began one year ago with an attack of pain of a severe, boring character, located in the upper left quadrant of abdomen. At that time he passed large quantities of foul-smelling urine, which was very cloudy and contained a thick, tenacious material. This attack cleared up under treatment.

Present attack began last August and resembled the previous one. It seemed to follow an ordinary cold. The

principal evidence was seen in the cloudy, thickened condition of the urine. In December last *pain* reappeared in the left side and abdomen.

(*b*) No *hematuria*.

(*c*) *Urine* freely purulent; great frequency of urination.

Physical Examination. Palpation: large and readily palpable left kidney. No cystoscopy; *x*-rays show suspicious shadow, which is indefinite.

Examination of Urine. Large quantity of pus; bacteria; some albumin. No tubercle bacilli.

Exploratory operation determined upon.

Operation. February 9, 1907. The kidney is readily exposed by a lumbar incision and is found to be enormously enlarged; it feels little more than a pus sac or cystic tumor. The ureter is greatly thickened. The kidney and as much of the ureter as possible removed. Recovery uninterrupted. The urine clears up until it becomes perfectly transparent and normal.

Examination of Specimen. Section of the kidney showed simple ulceration and abscess formation. Almost the entire kidney substance outside of the abscess is replaced by inflammatory fibrous tissue, through which are areas of round-cell infiltration and exuded leukocytes. A few glomeruli are present, but the tubules of the cortex are completely atrophied. There are no evidences of tuberculosis.

Remarks. Pain directed to the kidney. Marked vesical symptoms. Uncertain *x*-ray result. Question between tuberculosis and stone. Gross appearance of specimen strongly tuberculous, which the pathological examination, however, disproved. (See Fig. 3.)

Case V.—*Tuberculous Kidney.* (Figs. 4 and 5.) Patient aged twenty-eight years.

Symptoms. (*a*) *Pain:* Severe in character in right kidney, and reflected downward toward the thigh; irregular in duration.

(*b*) No *hematuria*.

(*c*) *Urine* purulent.

Urination markedly frequent during attacks of pain; less frequent between times. Vesical pain during urination. Condition grew progressively worse while patient was under observation, and urination became so frequent that incontinence occurred.

Family History. One aunt who died of tuberculosis.

Physical Examination. Palpation: right kidney not palpable, left kidney negative. Right ureter thickened and enlarged.

Cystoscopy. Bladder capacity four ounces. Urinary jet from right side purulent. An ulcerated area is seen surrounding the right ureteral orifice and another in the upper quadrant of the bladder.

Urinary Examination. No tubercle bacilli found.

Operation rejected at first, but conditions grew gradually worse, complicated by febrile attack.

Operation. Kidney exposed through a longitudinal lumbar incision. An abscess was found in the anterior surface of the kidney and several cheesy areas near the cortex. Ureter much thickened. The kidney was obviously tuberculous.

The patient was turned to the opposite side and a small, longitudinal incision made along the opposite kidney, which was palpated with the finger and found to be, as near as could be judged, normal in contour and size.

The affected kidney was then removed with a portion of the ureter. Patient left the hospital in five weeks.

Report of urine from remaining kidney *after* operation:

Quantity in twenty-four hours, 1440 c.c.; urea, 28.16 grams; albumin, a trace; some pus in the urine; very few cells; no tubercle bacilli.

Examination of specimen shows an abscess in the anterior surface. Pelvis markedly dilated. Microscopically, shows groups of tubercles with cheesy centres extending into the cortex.

Diagnosis of tuberculous nephritis and suppuration involving the ureters and pelvis of the kidney (pyelonephritis) was made.

Two years following operation patient was seen and found to be much improved in general health, having gained in weight twenty pounds.

Remarks. Predominant vesical symptoms. The presence of tubercles in the urine not established before operation, but general appearance of kidney justified diagnosis of tubercle. The presence of the other kidney being established, the extensive involvement of the right kidney, with pyogenic infection, called for its radical removal. (See Fig. 5.)

Case VI.—*Tuberculous Kidney.* (Fig. 6.) Patient aged twenty-six years; January 13, 1906.

Family History. Negative.

Symptoms. (*a*) *Pain:* Present complaint commenced last April with sudden, sharp, and severe pain in the upper quadrant of right abdomen and right lumbar region, extending downward to the symphysis pubis. This pain lasted for variable intervals, and has come on every few days. There has also been pain of a burning character during and after urination; the urination has been increased in frequency, and the quantity of urine has been greater during the paroxysms.

Abstract of Symptoms. Sharp paroxysm of pain in lumbar and abdominal regions; burning and frequent urination.

(*b*) No *hematuria.* Pyuria.

Physical Examination. Right kidney is palpably enlarged and tender; right ureter thickened. Left kidney cannot be felt by palpation.

Cystoscopy. Bladder wall thickened, but no areas of ulceration. Left ureter is seen acting freely.

An unsuccessful attempt is made to catheterize the ureters. The right ureteral mouth is so contracted that a catheter cannot be introduced.

Examination of Urine Before Operation. Urine pale amber, cloudy, no odor, acid; albumin, marked trace; specific gravity, 1015; many pus cells; cubical epithelial cells; tubercle bacilli found.

As the indications pointed toward an active surgical lesion in the right kidney and as cystoscopy had demonstrated an active functionating kidney on the left side, ureteral catheterism having been unsuccessful, exploratory operation determined upon May 7, 1906.

The right kidney is exposed through an incision in the right lumbar region and the kidney is found to be markedly enlarged and extensively diseased. There were many cheesy areas and large foci of necrotic tissue. In the lower pole there is evidence of advanced disease. (See Fig. 6.) Kidney removed. Wound heals slowly; but patient sustains operation fairly well. Patient discharged from hospital May 19, 1906, improved in general condition.

Remarks. It is evident that the remaining kidney is also diseased, but, on account of the removal of the most active focus in the right kidney, it is hoped that the ultimate result will show itself in improvement in the remaining kidney.

Case VII.—*Rupture of the Kidney.* (Fig. 7.) Patient aged forty-five years.

Patient was struck by wheel of large baggage truck in the right side, between pelvis and ribs. Contusion of right side. A large, rounded mass palpable in kidney region. Severe pain and tenderness.

Symptoms. Urine contains bright-red blood. Five days after injury urine continues to show abundance of blood and some leukocytes and enlargement over kidney is much more marked; general condition has gradually failed.

Operation. Incision in the right lumbar region. An enlargement the size of a child's head is exposed, which, when opened, is found to contain the kidney and free blood clots. Complete rupture of the kidney is found; the hemorrhage

continues with profuse flow, on which account it is necessary to clamp the vessels, and kidney is removed.

Patient makes a rapid and uninterrupted recovery.

Examination of urine after operation shows that the remaining kidney secretes satisfactorily.

Examination of specimen shows complete rupture of the kidney almost into halves, and a number of areas of suppuration. (See Fig. 7.)

Case VIII.—*Rupture of Kidney.* (Fig 8.) Patient aged twenty-five years.

Accident: patient was struck on the right side by a falling wall.

Symptoms. Contusions of right side. Great tenderness over right kidney, front and back. Greater rigidity of right abdomen. A large mass is palpable in the right kidney region.

Bright-red blood in the urine.

Urine, three days after admission, shows blood; numerous hyaline, epithelial, and granular casts. Leukocyte count, 15,000.

Operation. Exploratory nephrotomy. Large quantity of blood clot is found surrounding the kidney. Organ is ruptured through the pelvis. There are a number of areas showing secondary changes suggestive of beginning suppuration. Kidney removed.

Patient left the hospital four weeks after operation.

Examination of specimen shows zigzag tear running into the pelvis, almost reaching the outer border. In the cortex are secondary changes, necrotic in nature. (See Fig. 8.)

Microscopic examination by Dr. Sondern yields the following report: Albuminous degeneration of the lining of Bowman's capsules. Proliferation and degeneration of epithelium in the cortical tubules. Diffuse infiltration between the capsules; large areas have lost their staining power and have been converted into necrotic masses. Connective

tissue between tubules edematous and diffusely infiltrated with pus cells.

Diagnosis: Acute diffuse suppurative nephritis.

Remarks. Nephrectomy was done in Case VII on account of extensive laceration and continued hemorrhage, and in Case VIII on account of evidence of beginning suppuration and general physical deterioration.

Case IX.—*Trauma of Kidney; Secondary Nephrectomy.* Boy aged thirteen years. Patient sustained injury from falling downstairs. Was thought to have general peritonitis, and a laparotomy was performed three days after injury. Four weeks later a large swelling appeared in the lumbo-abdominal region, which was punctured and emptied. Somewhat later, the swelling having returned, a lumbar incision was made to drain what was a hydronephritic sac. This all occurred previous to the time the patient was seen by the writer, which was about three months after the injury, when the wounds had healed with the exception of a large urinary fistula over the site of the right kidney. In spite of the large amount of drainage of urine through this fistula there was a normal amount of secretion from the bladder.

Operation. Kidney exposed through lumbar incision with difficulty on account of adhesions. The ureter is completely occluded in a mass of scar tissue at the site of the rupture, which had extended into the pelvis.

Kidney is removed and the boy makes a good recovery. (See Fig. *c.*)

Remarks. The competency of the remaining kidney was established at the time of operation by the quantity of normal urine obtained from the bladder and the fact that the ureter on the injured side was completely occluded.

Case X.—*Pyonephrotic Kidney.* (Fig. 9.) Haughton, p. 20; April 19, 1907.

Family History. Mother died of tuberculosis; no further history of tuberculosis.

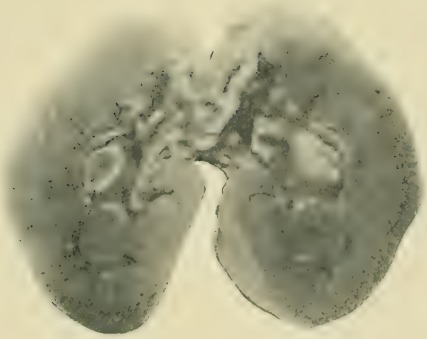


FIG. *c*

Symptoms. Pain: severe, sharp, dragging pain in right lumbar region; not reflected; almost continuous in character; worse in the upright position; duration, about two months.

Hematuria. No history of such.

Pyuria. Urine freely purulent; heavily laden with free pus and purulent clumps.

Urination. No frequency of urination past or present; no pain connected with urination excepting that associated with the passage of large plugs of purulent material.

Previous History. No venereal disease; no injury. About eighteen months ago was attacked with a sudden illness, consisting of chills and fever and general malaise. At that time this malady was called "kidney trouble;" another similar attack six months subsequently.

Diagnosis. Palpation: A large and readily palpable, freely movable mass in the right lumbo-abdominal region, sensitive to pressure. Left kidney region negative.

Cystoscopy. The bladder is cleansed with great difficulty; after fifteen or twenty minutes' washing the return is still hazy. Observation cystoscope introduced; right ureteral mouth dilated; a heavily clouded urinary jet is recognized. Satisfactory observation of the opposite side is not accomplished.

X-rays. Negative.

Urine is turbid; contains heavy sediment; about one-third volume of pus; specific gravity, 1017; acid; large percentage of albumin. In a microscopic examination nothing is noted beyond the presence of pus. Frequent examination for tubercle negative.

Blood Examination. Leukocytes, 12,000; polynuclears, 62 per cent.

Operation. Lumbar nephrectomy, April 25. Three days after operation urine still purulent, but bulk of pus markedly diminished. Examination of specimen reveals no tubercle.

Remarks. Causative factor not demonstrated; the potency of opposite kidney not established prior to operation; but the

condition of the affected kidney, which was nothing more than a pus sac (Fig. 9), justified its removal and reliance upon the other organ.

CASE XI.—*Parenchymatous Nephritis; Suspected Tuberculous Kidney.* (Fig. 10.) L. M., aged nineteen years.

Family History. Father, mother, and one sister died of tuberculosis. One living sister reported to have pulmonary tuberculosis and patient herself had history of hemoptysis.

Symptoms. (*a*) *Pain:* Sharp pain in left side, much aggravated by walking and movements of body; duration, eight years.

(*b*) No *hematuria.*

(*c*) *Urine* practically normal in appearance and contains only a small percentage of albumin and here and there a hyaline cast.

Physical Examination. Both kidneys are palpable. Left kidney is acutely tender to pressure.

Report of Dr. Barringer:

Cystoscopic Examination. Bladder capacity, 175 c.c. Bladder washed clear on first washing excepting for a few flakes. Entire bladder mucous membrane normal. Right ureteral orifice normal, contracting regularly. Left ureteral orifice normal, contracting regularly.

Separation. Separator remained in place twenty minutes. In that time 6 c.c. of clear urine flowed from the right tube and 0.5 c.c. of clear urine flowed from the left.

Analysis:

Right urine.	*Left urine.*
Color, yellow.	Light yellow.
Appearance, clear.	Clear.
Urea, 0.007 gm. to 1 c.c.	Not *q. s. urea present.*
Microscopic.	
Red blood cells, none.	None.
White blood cells, rare leukocyte; no pus.	Rare leukocyte; no pus.
Epithelium, rare squamous.	Rare squamous.
Casts, two hyaline	None.

Remarks. The right kidney seems to be doing practically normal work according to the quantity secreted, although the amount of urea secreted seems to be a little low.

The left kidney seems to be doing but very little work.

Catheterization of the Ureters, April 9, 1907. Both ureters were easily catheterized; the right ureter excreting 2.5 c.c. in ten minutes (5 c.c. in twenty minutes), and the left ureter excreting 0.5 c.c. in twenty minutes.

Analysis:

Right urine.	*Left urine.*
Color, yellow.	Light yellow.
Appearance, clear.	Clear.
Urea, 0.008 gm. to 1 c.c.	Not *q. s.*
Microscopic.	
Red blood cells, rare.	None.
White blood cells, none.	None.
Epithelium, rare squamous.	Rare squamous
Casts, none.	Rare hyaline.
Mucus, present.	None.

Remarks. The separated and catheterized specimens entirely agree.

Operation. Kidney exposed. Ureter catheterized from above downward. General appearance anemic, with several areas of density throughout the organ. Kidney removed.

Postoperative examination of urine reveals that remaining kidney is functionating and compensating satisfactorily. The urine is to all intents and purposes normal, there being present only a few pus cells, evidently from the operative field.

Pathological Examination of Specimen by Dr. Sondern. The kidney is normal in shape and size. There is subcapsular congestion and slight hemorrhage. Section shows the cortex normal in thickness, but pale. The pelvis shows submucous hemorrhages. Microscopically, the connective-tissue elements are found normal in amount. There is slight

congestion in places. The parenchyma shows cloudy swelling and extensive sloughing. The tubules are filled with the debris of disintegrating cells. Some of the glomerular cavities also contain debris. Section through the calices of the pelvis shows the epithelium intact. Just beneath it there is an extensive hemorrhage extending with interruptions almost around the lumen. No tubercles found.

Diagnosis. Parenchymatous nephritis; hemorrhagic pyelitis.

Remarks. The fact that nephrotomy was performed in this case without conclusive evidence of tuberculosis might call for criticism. Besides the overwhelming family history of tuberculosis, the existence of a pain of long duration located in and identified with the kidney, the very deficient functionating power of this kidney, and several areas of hardness found upon operation, and the history of hemoptysis led to the conclusion that, if these areas were not tuberculous, the chances of their undergoing such changes in the future were so great that the benefit of the doubt was given the patient by the removal of the kidney.

CASE XII.—*Double Pyelonephritis.* (Figs. 11 and 12.) W. G. H., aged sixty-five years; April 3, 1907.

Symptoms. Active symptoms directed to bladder and prostate. Marked urgency and frequency and difficulty of urination; much pain; almost complete retention. Catheter goes with difficulty, and causes great distress. Three days after first examination severe pain in right kidney, spontaneous in occurrence; no hematuria; *urine freely purulent and foul.*

Diagnosis. (*a*) *Palpation:* Neither kidney is palpable. (Patient put into hospital and perineal drainage performed.)

(*b*) *Cystoscopy* (*Perineal*)*:* The right urinary jet is freely purulent and the ureter dilated and congested. Left ureter dilated and congested; urinary jet not noted.

(*c*) No *x*-rays.

Operation. On account of progressive diminution and almost complete anuria, the urine secreted being almost solid with pus and reduced to six drams in as many hours, operation upon the right kidney is determined upon.

The kidney is incised and found to be the seat of acute infection; the pelvis is full of foul, purulent urine.

Because of the uncertainty as to the capacity of the opposite kidney the kidney is not removed, but sewn in wound. Patient died seven hours after operation.

Pathological Examination of Opposite Kidney. (Fig. 12.) Section of the left kidney through the cortex, extending from the margin of one of the ulcerating areas into the fatty capsule, shows the following condition:

The tubules show almost complete atrophy, only a few scattering ones remaining, which have a flat or very low cuboidal epithelium. Many of them contain casts and a few necrotic debris. The walls of the bloodvessels are very much thickened. The glomeruli are completely atrophied and replaced by hayline fibrous tissue. The main tissue present is a fibrous inflammatory tissue which is very cellular. There are young bloodvessels developed throughout, giving the appearance of granulation tissue. There are many phagocytes present holding light-yellow, granular pigment. The capsule is thickened and very adherent to the cortex and also to its fatty capsule by inflammatory fibrous tissue.

Remarks. An examination of the history of this case seems to justify the operative procedure throughout. The patient came with complete retention of urine and sepsis, but no symptoms directed to the kidney; and therefore there was no choice of operation, the indication being for immediate perineal drainage. Perineal cystoscopy revealed the implication of the right kidney and the probable involvement of the opposite side. The progressive anuria called for immediate operation, and the abscess of the right kidney justified this course. This kidney was so acutely and diffusely infected

that its removal, under ordinary circumstances, would have been desirable (Fig. 11); but the involvement of the opposite kidney made such a course improper; and therefore nephrotomy alone was performed. The postmortem examination of the opposite (left) kidney demonstrated the wisdom of such a course, and, furthermore, revealed that a double nephrotomy would not have changed the outcome, as the left kidney was little more than a fibrous mass encapsulated within a fatty sac (Fig. 12).

THE PATHOLOGY, DIAGNOSIS, AND TREATMENT OF ACUTE UNILATERAL SEPTIC INFARCTS OF THE KIDNEY.

By George Emerson Brewer, M.D.,
New York.

One year ago the writer presented a paper to the Chicago Medical Society, entitled "Some Observations upon Acute Unilateral Septic Infarcts of the Kidney."

In that communication he reviewed the entire subject of hematogenous renal infection, called particular attention to the acute unilateral variety, spoke of its obscure symptomatology, its rapidly fatal progress, and its successful treatment by early nephrectomy. At the same time the writer described a series of laboratory experiments undertaken to ascertain, if possible, the various etiological factors present in these cases. These experiments demonstrated the necessity of two essential conditions, namely, a bacteriemia and a diminished resistance on the part of the tissues of one kidney; they also clearly indicated the effects of trauma, calculus disease, and renal retention, as determining causes of the unilateral character of the lesion. The paper was illustrated by numerous photographs of the gross lesion, as well as a few microphotographs of the histological appearances in both the human and experimental varieties.

Since the publication of that paper a number of successful cases have been reported to the New York Surgical Society, and the criticism has been made that nephrectomy is not

always necessary in these cases. In my former paper I was dealing only with what might be termed the peracute form of the disease, in which nephrectomy is absolutely necessary to save life; and, although I distinctly indicated that the milder varieties of the malady could be treated by less radical measures, I feel that it is desirable to present another communication on the subject, in which the milder as well as the severer types of the affection will be considered.

The disease, like appendicitis, lies on the border line between medicine and surgery, in that in its milder manifestations it frequently recovers spontaneously, while its severer type requires prompt, surgical treatment; unlike appendicitis, however, its symptomatology is still obscure, as in the majority of instances the condition is unrecognized or wrongly diagnosticated in the early stage, when treatment is most effective.

It is a well-known and generally accepted fact that, during the progress of any acute infectious or septic disease, certain microörganisms, giving rise to the symptoms, find their way into the blood current, and are either destroyed by the bactericidal action of the blood itself or by substances encountered in the passage of the blood through certain organs, or they are excreted through the kidneys. Pernice and Scagioni, in 1894, published in Virchow's *Archiv* the results of an elaborate series of experiments showing the anatomical changes occurring in the kidneys by the excretion of various pathogenic and non-pathogenic bacteria.

Albarran, in his admirable thesis published in 1889, reviewed the entire subject of renal infection, and concluded that ordinary pus cocci may, under certain conditions, be eliminated through the kidneys without producing marked anatomical lesions; their elimination, on the other hand, may give rise to a bacteriuria, to a glomerular nephritis with degeneration of the epithelium, to multiple non-pyogenic infarcts, to pyogenic infarcts giving rise to multiple abscesses,

to perinephritic abscess, to pyelonephritis, or to a rapidly fatal toxemia. He also stated that the effects of trauma, excessive functional activity, the presence of toxic products, and renal retention, all served to accentuate the process and to favor the formation of graver lesions.

The presence in the blood of pathogenic microörganisms capable of producing metastatic accidents in the kidneys may, according to Israel, arise from absorption from the intestine, from acute infectious diseases, from local suppurations, as furuncles, carbuncles, paronychias, etc., and also from infection of the lower urinary passages.

It would naturally be inferred that such blood infections would produce bilateral lesions, but Simon, Alexander Johnson, and others have emphasized the fact that, in a large number of cases of hematogenous infection, the renal lesions are unilateral; the cause which determines the lesions in one kidney only, being a diminished resistance of that organ as a result of previous disease or injury.

In enumerating some of the predisposing factors, Israel mentions calculus disease, ureteral obstruction producing renal retention, trauma, floating kidney, etc., as frequent determining causes of unilateral lesions. Singer, in 1883, reported a case of unilateral renal suppuration occurring during an attack of typhoid fever in a kidney severely injured eighteen years before the attack. Quincke reports a similar case seventeen years after such an injury. Numerous other examples of unilateral renal suppuration following trauma are reported by Simon, Tuffier, Rayer, Johnson, Rosenburger, and Levi. Regarding the infecting agent in these cases, Israel considers the colon bacillus the most frequent, but also reports cases due to the streptococcus and staphylococcus aureus. Alter has reported a case of unilateral renal abscess in which the pneumococcus was demonstrated. Cases due to the typhoid bacillus have been reported by Singer and Comba. Cohn, in 1902, reported 4 cases of

suppurative nephritis in which the infection was traced to furuncles, in one of which the presence of a calculus was evidently the determining cause. More recently, Jordan has reported 12 cases of renal and perirenal suppuration in which small foci of peripheral infection were considered as etiological factors.

It will thus be seen that hematogenous infection of the kidney has been recognized for many years, that the various pathological changes in the kidney substance as the result of such blood infections have been well worked out by the pathologist, and the relationship between this form of infection and the more easily recognized gross renal suppurations has been admitted by most clinical observers.

It seems to the writer a matter of considerable surprise that, while all of this work was being carried out, no one seemed to recognize the most serious and important clinical type of acute hematogenous renal infection, or, if they recognized it, they failed to place their observations on record or describe it clinically.

So far as I have been able to ascertain, it was not until the publication of my original paper on the subject, in May, 1906, that the disease was described as a distinct pathological entity.

In that communication, after referring to the etiology of pyonephrosis, pyelonephritis, and perinephritis, I stated that "in nearly all the cases to which reference had been made the disease was well advanced, and one or more fairly large collections of pus were found. It is not, however, of these easily recognized terminal conditions of renal infection that I desire to speak, but rather of the earlier stages of the process, when the clinical picture is often one of an acute general infectious disease, in which the local manifestations are so slight, and so generally overshadowed by the symptoms of general toxemia, that they are frequently overlooked, unless a more than ordinarily careful, physical examination

is made. These cases are often so acute in their onset, and so rapidly progressive in their septic manifestations, that death may ensue before any distinctive renal or urinary symptoms are observed."

Case I.—My first observation of this severe type of renal infection occurred eleven years ago at the City Hospital. The patient was a female, aged twenty years, admitted to my service suffering from double femoral fracture and multiple contusions of the body. After some three weeks of treatment, during which there were no evidences of disease or infection of any kind, she suddenly became violently ill, with symptoms suggesting an attack of la grippe. The temperature rose to 104° F. or more; the pulse was accelerated; she complained of pain in the back and extremities. After two or three days of observation, a careful examination revealed tenderness over the right kidney, albumin and pus in the urine. Exploratory nephrectomy was advised, and refused by the patient. The symptoms increased in severity; she complained of constant aching pain in the right flank, had a number of chills, became delirious, and presented every evidence of a profound and rapidly progressive sepsis. At no time did she complain of pain or tenderness over the left kidney. Consent was finally obtained for operation.

Under a general anesthesia, the right kidney was exposed by a lumbar incision. The perirenal fat was found to be edematous, the surface of the kidney was studded with deep-red, elevated lesions. On incising the cortex, the entire parenchyma was found to be filled with minute abscesses, the largest being about 0.5 cm. in diameter. There was considerable hemorrhage from the cut surface of the kidney, which was controlled with difficulty. As the patient's condition was critical, the kidney incision was packed with gauze and the external wound partly united and dressed. She died within twelve hours.

Then followed 2 other cases almost identical in onset,

clinical history, and pathological findings. In both of these cases the kidney was explored, incised, and drained. Both died within twenty-four hours.

Up to this time I feared to perform a nephrectomy for the reason that I believed the lesion to be bilateral, although the symptoms pointed to one side only. This view was strengthened by a striking case of bilateral hemotogenous infection reported by Lilienthal, in which recovery followed a double nephrotomy.

The next case was, as will be seen, more carefully studied, and, the treatment being the same, the autopsy gave me my first definite conception of the true pathological lesion, and clearly pointed to more rational and radical treatment.

Case II.—The patient was a man, aged twenty-one years, who complained of general abdominal pain and frequent micturition, with hematuria. The symptoms temporarily subsided, but three weeks later the pain became localized over the right kidney region, and was accompanied by a gradually rising temperature and other symptoms of progressive sepsis. On examination, there was tenderness and some muscular rigidity in the right flank. The urine was albuminous, contained some pus, a few red cells, and casts. Urine from the right kidney was scanty, highly albuminous, contained many red and a few white cells; that from the left practically normal. Temperature, 105.5° F.; leukocytes, 20,200. No evidences of other septic foci could be found. The right kidney was exposed by a lumbar incision, and freely opened by a cortical cut. The entire parenchyma was studded with minute abscesses. Drainage was inserted, and the wound partly closed. There was marked improvement in the symptoms, which continued for several days, but this improvement was succeeded by a gradual return of the septic manifestations, with scanty albuminous urine, delirium, and death.

On autopsy, the right kidney was found to be completely

destroyed by numerous abscesses. The left kidney, spleen, and other organs showed the presence of very recent septic infarcts, which had not broken down. Cultures demonstrated Streptococcus pyogenes. In this case the lesion was evidently unilateral at the time of the first operation, and had the kidney been removed at that time, recovery would probably have occurred.

My first successful case was the following:

Case III.—A woman, aged twenty-eight years, experienced an attack of chills, fever, and general prostration, and was treated for malaria. An examination of the blood revealed no plasmodia, and upon subsequent examination a prolapsed and tender kidney was easily palpated. Urinary examination was negative. Under chloroform anesthesia the kidney was explored and incised. The cortex was studded with small areas, the exact nature of which could not be determined at the time. The organ was removed, and on subsequent examination it was found to be the seat of numerous infarcts. The patient made a complete recovery.

The following case is of interest as illustrating how rapidly improvement may follow the removal of such a kidney, even under the most unfavorable conditions:

Case IV.—A female child, aged three years, was brought to the Vanderbilt clinic suffering from left-sided abdominal pain, high fever, and great bodily weakness. The temperature was found to be 103.8° F.; pulse, 130. An examination of the chest and abdomen was negative; slight tenderness in the costovertebral angle. Urine drawn by catheter was found to be albuminous, and contained a few pus cells. No vesical irritability; no other sign of local infection.

The patient was transferred to the Roosevelt Hospital, where it was discovered that the hands and feet were desquamating. Inquiry regarding exanthematous disease revealed the fact that she was supposed to have had measles four weeks before she was admitted. She was subsequently

examined by Professor A. Jacobi and an inspector from the Board of Health. Both pronounced the condition in all probability one of scarlatinal desquamation. The infant was removed to her home and quarantined. Five days later the mother came to the clinic and reported that the child had grown steadily worse and was apparently dying. The temperature had ranged between 103° F. and 105.5° F. during the week; the pulse from 130 to 160; the urine was scanty and cloudy; the child was thoroughly prostrated. Assisted by Dr. Turnure and Dr. Darrach, of the Vanderbilt clinic surgical staff, I did a hasty nephrectomy in the parents' home. The kidney was surrounded by an edematous fatty capsule; the organ was enlarged and highly congested; the fibrous capsule presented nothing abnormal, but on stripping it from the renal parenchyma the surface of the kidney was covered with deep violet, oval, and irregular lesions, which, upon section, contained bloody serum and granular-necrotic tissue. On section, the cut surfaces presented many similar lesions, as well as a number of triangular infarcts. Cultures taken from several lesions with the greatest care showed no growth after three days. The improvement in the child was marvellous. The temperature dropped several degrees within twelve hours, the pulse improved, and the infant made an uninterrupted recovery.

The following 2 cases illustrate how closely this condition may resemble acute appendicitis or inflammation of the gall-bladder. In no less than six instances, during the past two years, the writer has known of a primary, anterior incision being made, in the belief that the symptoms were due to some intra-abdominal infection. In each instance no intra-abdominal lesion was found, the laparotomy wound was closed, and an acutely infected kidney discovered by a lumbar incision.

Case V.—A woman, aged twenty-two years, experienced a severe pain in the epigastrium and right side of abdomen,

with vomiting and high fever. She was sent to the Roosevelt Hospital with a diagnosis of acute appendicitis. On examination, the appendix region was free from evidences of inflammation. There was, however, pain and muscular rigidity in the right hypochondriac region, with tender points over the gall-bladder and the costovertebral angle. Temperature, 105° F.; pulse, 120; leukocytes, 18,000.

Cystoscopic examination was negative; urine from the right kidney scanty and slightly albuminous, few pus and blood cells; that from the left kidney was abundant and apparently normal. Widal negative; no plasmodia; no tubercle bacilli in the urine. The diagnosis rested between an acute infection of the gall-bladder or kidney, small anterior incision; gall-bladder and liver found to be normal, but the right kidney seemed enlarged. Anterior incision united, and the kidney exposed by lumbar route. The perinephritic fatty tissue was edematous; the kidney enlarged, highly congested, and the seat of innumerable small infarcts. Nephrectomy was performed. After operation the temperature fell from 105.5° F. to 97° F. within twelve hours, and thereafter remained practically normal.

She made a satisfactory convalescence. Microscopic examination of the specimen showed it to be filled with minute, embolic abscesses.

One year later this patient married and became pregnant. I had an opportunity of examining her urine before and after her confinement. It was normal in every respect. Her confinement was normal, and she presented the picture of robust health two months later.

Case VI.—A young married woman was admitted to the Roosevelt Hospital, suffering from right-sided abdominal pain, high fever, and extreme nervous restlessness. Six weeks before she had an attack of supposed peritonitis from unknown cause. After recovery from this, she remained well until forty-eight hours before admission to the hospital,

when she began to complain of pain in the region of the gall-bladder, with vomiting, and a rapidly rising temperature. On admission the temperature was 105.8° F.; pulse, 140; respiration rapid and jerky. Examination of the chest was negative. On attempting to palpate the abdomen, the patient complained of such extreme tenderness, and became so excited and hysterical, that nothing could be elicited. (These symptoms were undoubtedly exaggerated by the presence of coexisting exophthalmic goitre.) The following morning the temperature had fallen to 102° F., but the pulse was extremely rapid and weak. Abdominal palpation revealed tenderness and marked muscular rigidity in the upper right quadrant, tenderness to pressure over the lower costal arches, and some pain on pressure over McBurney's point and in the costovertebral angle. Blood count showed 16,000 leukocytes and 79 per cent. polynuclears. Urine was abundant, contained a trace of albumin and a few pus cells. She was immediately prepared for operation, the diagnosis resting between cholecystitis, subphrenic abscess, or abscess of the liver. An incision through the right rectus muscle revealed no intra-abdominal lesion, save a slight redness and edema of the peritoneum overlying the right kidney. The anterior incision was closed, and the kidney exposed by a lumbar opening. The perirenal fat was edematous, the kidney was highly congested, and its cortex studded with dark-red lesions. Nephrectomy, followed by an intravenous infusion of 1500 c.c. of normal salt solution. After removal the kidney was bisected and found to be the seat of numerous infarcts and minute abscesses.

Cultures taken from a freshly opened abscess gave a growth resembling the colon bacillus, but on further investigation it was found to be a non-pathogenic organism, probably a contamination. The patient made an uninterrupted recovery, the temperature falling to normal immediately after operation.

I desire now to give an example of the severest type of the disease which has come under my observation. It also illustrates the disastrous results of delay. If she had been admitted to the hospital in the early stage of her disease, nephrectomy would undoubtedly have saved her life.

Case VII.—A woman, aged thirty-one years, was admitted to the Roosevelt Hospital in a condition of profound septic intoxication. She had had occasional attacks of abdominal pain, of short duration, for the past six months. Eleven days before admission she experienced severe pain in the right side of the abdomen and flank, extending upward to the chest; this was accompanied by chills, high fever, delirium, and great prostration. At the time of her admission to the hospital her temperature was 106.5° F.; pulse, rapid and weak; leukocytes, 35,000. On palpation, the only sign that could be elicited was tenderness and muscular rigidity in the right kidney region. The urine contained albumin and a few pus cells. As her condition was extremely critical, she was immediately prepared for operation. On exposing the right kidney, there was found a small focus of pus in the fatty capsule near the kidney cortex. The condition of the patient would not admit further exploration, and she was saved from death on the table only by an intravenous infusion of salt solution. The temperature rapidly rose to 112° F., and the patient died in a few hours. Autopsy revealed only multiple abscesses and infarcts of the right kidney. Cultures showed *Staphylococcus pyogenes aureus.*

Although numerous other examples of the severe type of the disease could be reported from my own experience, or from those of my colleagues at the Roosevelt Hospital, I desire next to call attention to a few of the milder types, in which measures less radical than nephrectomy may be successful.

Case VIII.—A woman, aged twenty-six years, complained of severe right-sided abdominal pain, with nausea, headache, fever, and general prostration. Ten days later she was admitted to the Roosevelt Hospital; temperature, 102° F.; pulse, 120; leukocytes, 19,000, of which 81 per cent. were polynuclears. She complained of a bearing-down sensation on urination. The following day the temperature rose to 104° F.; 82 per cent. polynuclears on differential count. The patient was then cystoscoped. The examination of the bladder negative; ureters were catheterized, and from the right there was a scanty flow of urine, containing albumin, a few pus cells, and blood; from the left, more abundant flow, few red cells, practically no pus.

Physical examination revealed tenderness in the right costovertebral angle. The kidney was not palpated. Left side free from tenderness. Operation was performed on the tenth day of illness. Right kidney exposed by lumbar incision; edema of perirenal fat. Kidney was highly congested, and presented six distinct cortical areas of induration. Each of these was opened and packed with separate strips of gauze tape, which were allowed to protrude through the partly closed parietal wound. Of the six lesions, only one contained pus; the others, necrotic tissue. The renal pelvis was opened; the mucous membrane appeared normal. Cultures made from the pus showed the Bacillus coli communis. The patient made a tardy but complete recovery.

The following case is of interest on account of the double lesion.

Case IX.—A female patient, aged thirty-two years, was sent in with a diagnosis of acute appendicitis. The attack began by a severe right-sided abdominal pain, high fever, and prostration. There was marked muscular rigidity over the appendix and gall-bladder regions, with tenderness both in front and in the costovertebral angle. In this instance the urinary analysis showed no red cells, only albumin and a

few leukocytes. Temperature on admission was 102.4° F.; pulse, 120; leukocytes, 20,400. Although the temperature fell to 99.5° F. during the night, she was prepared for operation. An anterior incision was made, and the gall-bladder and appendix found to be normal. This was closed, and a lumbar cut revealed a large polycystic kidney studded with minute infarcts and small abscesses. As the toxic symptoms were already beginning to subside in this case, and as there was a strong probability of there being a polycystic and possibly imperfectly functionating kidney on the opposite side, we punctured several of the larger foci and stripped the fibrous capsule from the organ. She had a slow convalescence, complicated by an embolism of the third division of the right pulmonary artery. The recovery was, however, complete.

The next case, still more subacute, is of interest on account of the fact that the lesion resulted in complete absence of function.

Case X.—It was that of a married woman, aged twenty-three years, who was admitted to the Roosevelt Hospital with a diagnosis of renal calculus. Seven weeks before admission she experienced a severe pain in the right loin, radiating to the groin and thigh. This pain continued for from one to two hours and then suddenly subsided. Following the paroxysm of pain she had a severe chill, with fever and vomiting, which lasted for two days. During this period the temperature reached 103° F. Since the acute attack the patient had complained of more or less constant pain and discomfort in the region of the right kidney and ureter, with occasional attacks of a more acute nature.

On admission to the hospital she seemed weak and anemic. Her temperature was 100° F.; pulse, 120; and the blood count showed 10,000 leukocytes, 56 per cent. polynuclears. Physical examination revealed tenderness in the right costo-vertebral angle, and along the course of the ureter to the

pelvic brim. On cystoscopical examination the bladder appeared normal. There was no efflux from the right ureteral orifice, but an abundant flow from the left. Both ureters were catheterized. From the left there was an abundant flow of normal urine; from the right only a few drops were obtained after forty-five minutes; *x*-ray examination was negative. From these findings a diagnosis of subacute infarcts was made and an operation was advised.

Under ether anesthesia the right kidney was explored by a lumbar incision. The fatty capsule was somewhat thickened and adherent. The surface of the organ was studded with small, whitish areas which were moderately indurated. No calculus was felt. The fibrous capsule was stripped from the organ, the kidney replaced, and the wound sutured. There was a moderate febrile reaction following operation, which subsided on the seventh day. The wound healed by primary union. All sutures were removed on the tenth day. Fourteen days after the operation she was again cystoscoped and the ureters catheterized. From both catheters there was an abundant flow—12 c.c. from the right and 15 c.c. from the left in twenty minutes. Although the urine from the right side showed a very faint trace of albumin, its percentage of urea was higher than that from the left, showing that its function had been practically restored.[1]

To remind my readers that one may occasionally be mistaken regarding the virulence of a given case, I will relate the history of a patient whose symptoms and appearance seemed to warrant treatment less radical than nephrectomy.

Case XI.—A married woman, aged thirty years, had a severe chill, followed by high fever, prostration, and abdominal pain. When seen by her attending physician there was marked muscular rigidity and tenderness over the entire

[1] Since this patient returned to her home I have learned from her physician that she has pain in the region of the left kidney. I have not, however, had an opportunity of examining her.

right half of the abdomen, the point of greatest tenderness being immediately over the middle of the ascending colon. When seen by the writer in consultation, there was also found marked tenderness in the right costovertebral angle.

She was immediately transferred to the Roosevelt Hospital, where, upon examination, the urine was found to contain a trace of albumin, a few red blood corpuscles and pus cells. Temperature was 103° F.; pulse, 120.

On exploring the right kidney by a lumbar incision, it was found to be edematous and highly congested. Two or three fair-sized cortical abscesses were found and numerous smaller infarcts. The capsule was stripped from the kidney, the larger abscesses incised and packed with gauze, the wound partly closed, and an intravenous infusion of salt solution given. There was a marked temporary improvement in the symptoms. The temperature and pulse fell and she seemed brighter, but the pain continued and required morphine in considerable quantities for its relief. Two or three days later the temperature began to rise, the pulse increased in frequency, and she became restless and delirious. We hesitated to remove the kidney on account of the uncertainty regarding the functional competence of the opposite organ.

Her sepsis continued to deepen, however, the tongue became dry and brown, the urine diminished in quantity, the delirium increased, and she became more and more prostrated. As it was evident that she would surely die unless the kidney was removed, nephrectomy was hastily performed. The operation was associated with a considerable loss of blood from the slipping of a ligature on the renal pedicle. The loss was immediately made up by a large intravenous infusion of normal salt solution, which undoubtedly had a favorable effect on the profound toxemia. The relief was striking, the pulse improved, the temperature gradually fell to the normal, the mind cleared, and convalescence was finally established. Although many months

elapsed before she was completely restored to health, her recovery was, in the end, complete.

All of the foregoing cases have been examples of a more or less severe type of the disease, which imperatively demanded some form of surgical intervention. I now desire to speak of the mildest type of the affection.

During the past eighteen months I have observed 8 or 10 cases presenting symptoms practically identical with the preceding, but much milder in character, all of which, under expectant treatment, went on to a presumably complete recovery. I will give but three examples.

Case XII.—A young lady, aged twenty-five years, experienced an attack of right-sided abdominal pain, with fever, vomiting, tenderness, and muscular rigidity over the right lower quadrant. These symptoms had been preceded by a subacute attack of follicular tonsillitis. Her attending physician regarded the case as one of appendicitis, and asked me to see her in consultation, with a view to operation. At the time of my visit the temperature was 100° F.; pulse, 110. There was a slight tenderness over McBurney's point, which extended upward nearly to the costal border. The muscles were moderately rigid. There was marked tenderness in the costovertebral angle. As no urinary analysis had been made, I declined to operate upon her, on the ground that, in my opinion, the lesion was a unilateral hematogenous renal infection. I ordered an examination of the urine, and predicted that a trace of albumin would be found, a few red cells, and pus, if the specimen was precipitated by the centrifuge. The analysis proved this prediction to be correct. The patient made a satisfactory recovery without operative treatment.

Case XIII.—A young man, aged twenty-three years, was operated upon by me for an acute streptococcus appendicitis, with spreading peritonitis. Although quite septic at the time of operation, he made a satisfactory conva-

lescence. About the sixth day after operation, when the temperature had fallen to the normal, he experienced an acute stabbing pain over the lower ribs on the left side, with a sharp rise of temperature. I regarded the case as one of acute pleurisy, but, on physical examination, was surprised to find no definite signs in the chest. I called an expert medical consultant, who also was unable to find evidences of pleural infection. We were at a loss to account for the pain and fever, which continued for two or three days, when a urinary analysis showed a trace of albumin and a small number of pus and red cells. Subsequent examination revealed the characteristic costovertebral tenderness, and daily examination of the urine showed the unmistakable evidences of renal infection. The symptoms persisted for ten days or two weeks, but were never severe enough to warrant operative interference.

At the same time another patient in the hospital, after an operation for the removal of the appendix, experienced an identical attack. This case was subsequently seen by Dr. Klotz, who by cystoscopic examination and an examination of the separated urines, was able to confirm our diagnosis. She made a tardy though complete recovery.

The chronic forms of this disease are not infrequently encountered, and furnish an interesting group for further study, but the limits of this communication will not permit me to consider these at this time.

In conclusion, permit me to say a few words regarding diagnosis and treatment.

Diagnosis. The disease may or may not be ushered in by a chill. When present, it generally indicates a severe type of infection. The initial rise of temperature is high, generally 104° F. or 105° F.; the pulse is frequently 120 or above. The toxemia is marked from the first, and, with the high fever, suggests often an acute grip, lobar pneumonia, or one of the exanthemata. Then follows a more or less

vague pain in the abdomen or flank corresponding to the side of the lesion. Tenderness and muscular rigidity over the region of the appendix or gall-bladder leads often to error in believing one of these organs to be the seat of disease. As the urinary secretion from the infected kidney is greatly diminished, and is largely diluted by the abundant secretion from the unaffected organ, the mixed urine, when passed or drawn from the bladder, is often quite normal in appearance, and the slight trace of albumin, blood, and pus is often overlooked unless a more than ordinarily careful examination is made.

The one pathognomonical sign present in all cases is a marked unilateral costovertebral tenderness.

Treatment. In regard to treatment, the cases should be divided into three classes.

The severe type, in which the temperature remains high, and the toxemia is rapidly progressive. These cases require nephrectomy at the earliest possible moment.

The milder cases are those in which the initial temperature may be high, but begins to fall within forty-eight hours, and where the toxemia is less marked. These cases may often be successfully treated by decapsulation, which relieves the intense congestion and allows Nature to complete the reparative process. Where one or more cortical abscesses are present they should be opened and drained.

In the milder type, the case may be treated expectantly with a reasonable prospect of complete recovery, although the writer has observed two or three patients in which a chronic pyelonephritis has remained.

Statistics. The following are my own statistics to date: Nephrotomy and drainage in 5 patients of the severe type; all died. Nephrectomy in 8 patients of the severe type; all recovered. Nephrectomy, decapsulation, and drainage in 5 patients of the milder type; all recovered. Expectant treatment in 4 or more patients of the mildest type; all recovered.

EXPLORATION AND DECAPSULATION OF THE OTHER KIDNEY BEFORE COMPLETING A NEPHRECTOMY.

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In recent years an enormous amount of painstaking, scientific investigation and persistent, praiseworthy effort have been expended on the part of such masters as Koranyi, Kümmell, Casper, Israel, Rovsing, their assistants, and many others, with a view to finding and elaborating a reliable method of determining the functional activity or possibilities of each kidney separately, or of both kidneys combined, in advance of a contemplated or possible nephrectomy. The result of all this investigation and effort has been to add one after another to the already long and still growing list of so-called functional tests. Yet, despite the fact that every recent writer on the subject, without or with personal experience in the matter, feels himself called on to discuss at greater or less length all and sundry of the various functional tests of which he may have heard or read, it cannot be said that anything even approaching a consensus of opinion has been reached. On the contrary, so far from this being the case, we find the masters themselves at sea and divided in the matter. Some of them, while strenuously upholding each the utility of this or that method favorite with himself, deny all or much practical value to the methods employed by their confrères. Others, like Israel and Rovsing, for ex-

ample, deny all practical value to any of the modern functional tests, the latter falling back on the only method that has, to a certain extent, stood the test of time and experience, namely, the determination of the daily output of urea. Yet, in spite of the apparently discouraging present situation, the hope appears to be justified that the prodigious efforts put forth in the attempts to solve the problem will not have been expended in vain, but will result in giving us, at an early date, a practical, satisfactory, and generally acceptable method of determining the amount of work which we can count on any given kidney to perform.

Such knowledge is especially needed and becomes of vital importance on the eve of a contemplated nephrectomy. Is there a second kidney, and, if so, is it in condition to take up and to carry on unaided, to the full extent required, the elimination of poisonous waste products which can pass out of the system only through the kidneys, and a failure to eliminate which puts an end to life?

In the present state of our science and art the method of procedure introduced by me several years prior to the advent of the modern functional tests still constitutes our main reliance and ultimate resource. This method, which I first practised in 1894, and advocated in a paper[1] on "The Other Kidney in Contemplated Nephrectomy," consists in exposing and examining, through a second lumbar incision, the fellow kidney before completing an otherwise indicated nephrectomy.

The routine procedure which I have practised in all my nephrectomies, for the past ten years or more, consists in first cutting down on and thoroughly exploring the kidney that may require removal. A vital and essential part of such exploration consists in not disturbing in any way the vital connections of the organ at its root, the renal vessels

[1] Annals of Surgery, 1898, xxvii, 425–435.

and ureter. Should such exploration of the kidney confirm the necessity and indication for its removal, the kidney is, for the present, replaced, and a second lumbar incision, for exploration of the other kidney, is made on the opposite side of the body. If the second kidney be found in good condition, or in condition sufficiently good to sustain life, it is replaced, and the second wound is closed. Returning, now, to the first incision, the diseased kidney is delivered and removed. Should exploration, on the other hand, show advanced disease of the second kidney, or that nothing would be gained by the removal of either kidney, then both kidneys are replaced in the body, either closing both wounds or treating either or both kidneys by such conservative measures—decapsulation, nephrotomy, resection, drainage, etc.—as may be indicated under the circumstances.

This method of procedure in nephrectomy was, as above pointed out, first practised and published by me, although Rovsing[1] mistakenly claims priority in the matter more than six years after my publication. Rovsing bases his claim on an operation performed by him in 1894. In this case, one of renal hematuria, the healthy right kidney was first cut down on as the result of a mistake in diagnosis, necessitating a second incision for removal of the diseased left kidney. The original error of diagnosis, therefore, necessitated the second operation, quite a different matter from an operation of selection performed on the second kidney with a view to determining whether the kidney first exposed can be safely removed. Nor do any of Rovsing's writings between 1894 and 1904, although many of them deal with nephrectomy as such and detail cases of nephrectomy at great length, contain any mention whatsoever of the procedure under discussion.

The second lumbar incision for exploration of the other

[1] Arch. f. klin. Chir., 1904–5, lxxv, 867–895

kidney has three distinct purposes. In the first place, it gives absolutely positive information as to the existence or non-existence of a second kidney; in the next place, it enables the surgeon to determine the condition of that kidney; and, lastly, it places him in a position to decapsulate the remaining kidney. The advantages of the latter procedure will be commented on farther on.

The existence of a second kidney is of vital importance in nephrectomy. A number of cases are on record in which a patient's only kidney was removed, with the inevitable result. In addition to the recorded cases, a number of unpublished cases may be assumed to exist; I have personal knowledge of at least three such, and it must be stated emphatically that no method of examination at our command, short of exploratory incision, can give absolute and indisputable certainty of the existence of the two kidneys. Even catheterization of both ureters may deceive us on this point, as illustrated in the case presently to be related.

I have operated in all on three patients possessing, as determined by cutting exploration, but one kidney each. In 2 of the cases, the operation contemplated was not nephrectomy, and these two patients were, therefore, safe from the possible disaster of removal of their only kidney. Not so with the third patient, whose life was spared by virtue of the second exploratory incision, and whose story I will briefly outline:

Case.—N. J., a married woman, aged thirty-five years, came under my care in November, 1902, with pyuria, febrile attacks, and a tumor in the right flank diagnosticated as hydronephrosis affecting a movable right kidney. Cystoscopy showed two urethral orifices presenting no marked differences in appearance. On account of the pyuria, catheterization of the ureters was not performed at this examination, from dread of possibly infecting the presumably healthy left kidney.

Fixation of the loose hydronephrotic right kidney, per-

formed on November 10, 1902, afforded but temporary relief. Nephrotomy was next tried, on January 5, 1903; a large quantity of pus was evacuated and continued drainage was established. About 720 c.c. of urine drained away daily through the lumbar wound, while about 480 c.c. were passed daily per urethram. The latter amount was assumed—incorrectly, as was proved later—to come from the left kidney.

With the closing of the wound the old symptoms returned, and, with the concurrence of a consultant, nephrectomy was considered indicated, and was attempted on January 19, 1903. The right kidney was fully exposed and freed from its connections except at the root, where the renal vessels and ureter were left intact. The kidney, being temporarily replaced, a second incision was made over the left lumbar region. Search high and low, the peritoneum being freely opened to facilitate such search, failed to find a second kidney. The left wound was closed and the right kidney was freely incised for drainage, which was maintained for some six weeks, at the end of which time the wound closed spontaneously and permanently. With the exception of a very moderate amount of pus in the urine, the patient is well today, more than four years after the operation.

The existence of two ureteral orifices with but one kidney seemed to call for explanation, and certainly piqued curiosity. Catheterization of both ureters was performed some time after the operation, when the patient was again up and about. The right catheter passed freely up the right ureter to the kidney and yielded urine identical in composition with that obtained from the bladder. The left ureter was pervious to the catheter for some 20 cm., at which point the further progress of the instrument was arrested. Not a drop of urine came from the catheter, although the latter was allowed to remain some twenty minutes.

The case, therefore, was one of absence of the left kidney and the upper end of the left ureter, with presence of 20 cm.

of the bladder end of the left ureter. Were the absence of the left kidney not established beyond question, arrest of the ureteral catheter at 20 cm. from the bladder might be mistakenly interpreted as due to stricture of the ureter at that point, and not as demonstrating the absence of the corresponding kidney. In a similar manner, catheterization of both ureters in a case of solitary kidney with two ureters would fail to demonstrate the absence of one kidney. For any surgeon, therefore, depending on any and all means, short of direct cutting exploration, for determining the presence of two kidneys, the fatal mistake of removing a patient's only kidney is still among the possibilities.

Inspection and palpation, aided on rare occasions by exploratory puncture, of a kidney, at the bottom of an incision, or, better still, when delivered into the wound, will enable all but the veriest tyro to determine the presence or absence of gross lesions, such as tuberculosis, abscesses, stones, and tumors. If both kidneys be found affected with tuberculosis, advanced purulent degeneration, or tumor, nothing will be gained by removing either kidney, and a nephrectomy, possibly contemplated at the beginning of an operation, should be abandoned. If stones be found in both kidneys, it is usually the best procedure to remove the stones from both organs, draining or not, as may be indicated.

A different situation arises when it comes to the recognition of the finer structural changes which may affect a kidney. But even here it is, for the purposes of the surgeon, mainly a question of the extent and degree of such changes, and these, I maintain, can be readily appreciated after some experience in the examination of kidneys during life. It is not difficult—nay, it is very easy—to recognize advanced fatty and waxy degenerations, interstitial and other varieties of nephritis without the requirements demanded by the pathologist of splitting the kidney from end to end and through its entire thickness. If aid akin to this be needed, the surgeon may

remove a small piece of kidney tissue, examination of a frozen section of which can be made on the spot in a few minutes by a competent pathologist. Pending the decision of the pathologist, the surgeon may occupy himself with attention to necessary details of operation. Generally, however, if not always, the surgeon of sufficient experience in gross pathology will be able to decide from macroscopic appearances alone whether or not a given kidney is in sufficiently good condition to take up the burden imposed on it by the removal of its fellow.

Two good and sufficient reasons for exploration of the other kidney in contemplated nephrectomy have been advanced and discussed. A third reason or indication for exposure of the remaining kidney in nephrectomy has, within a more recent period, arisen in my practice. I refer to decapsulation of the remaining kidney for the purpose of preventing or lessening the liability to death from renal insufficiency, the so-called renal death. As one result of my work in the surgical treatment of nephritis, I have learned that two effects of renal decapsulation may be regarded as practically invariable and constant. First, renal decapsulation invariably and at once increases the daily urea output of the kidney or kidneys, and, second, renal decapsulation enables any kidney to do the best work possible for that particular kidney to perform. Both these results act directly to prevent a renal death, and, as a matter of fact, I have had no renal deaths in my nephrectomies of the past seven years, during which I have consistently practised decapsulation of the remaining kidney.

There can be but two possible objections advanced to the routine practice of exploration and decapsulation of the remaining kidney when performing nephrectomy, one objection partly including the other. These are increased risk to life and undue length of time required for operation. As regards increased risk of life, the objection is not valid, for

it is to prevent deaths due to absence of a second kidney, due to want of knowledge of its condition, and due to its inability to take up the burden of excretion necessary to maintain life, that exploration and decapsulation of the remaining kidney are advocated.

Operations on both kidneys at one sitting are no longer uncommon. My personal experience in renal surgery embraces 688 operations performed on one or both kidneys of 460 patients. In 232 of these patients only one kidney was operated on; in 228 patients operation was performed on both kidneys at one and the same sitting. In the earlier years of my surgical career simultaneous operation on both kidneys was the exception; in later years it has become almost the rule.

With good technique and proper posturing and handling of the patient during operation, exploration and decapsulation of the remaining kidney should not add more than from ten to twenty minutes to the time required for a nephrectomy. The disadvantages of a slightly prolonged operation are more than counterbalanced by the vital advantages gained for the patient in other directions.

In conclusion, and based on the foregoing, I would respectfully advance the proposition that no nephrectomy should be completed without examination and decapsulation of the remaining kidney.

UPON CERTAIN ASPECTS OF CALCULOUS ANURIA WITH ESPECIAL REFERENCE TO THE PERFORMANCE OF BILATERAL NEPHROLITHOTOMY SIMULTANEOUSLY IN SOME CASES OF THIS CONDITION.

By Francis Sedgwick Watson, M.D.,
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If in a case of calculous anuria one kidney is laid open and a stone is removed from it or from its ureter, and it is then seen that that kidney's secreting substance has been wholly destroyed, it is clear that the operation will have merely added more or less shock to the already critical condition of the patient without having secured any compensating advantage whatsoever. Equally is it obvious that whatever there may have been of renal functional activity possessed by the individual before the occurrence of anuria must have resided in the other kidney, and it is evident that the only hope of saving life under such circumstances lies in immediately cutting into that opposite kidney, since only by so doing can we set free its suppressed function, this suppression being the factor which will cause death if it is not overcome within a short time.

Now, if, instead of being wholly destroyed, the kidney first operated upon was seen to be in greater or less degree diseased, the logical inference would be that, in degree inverse to the extent of disease and functional incapability of this kidney, the other one would be found to be more or less free from disease and more or less functionally capable. In other

words, the worse the condition of the first kidney, the better may we expect to find that of the other one, and vice versa.

It is, as we all know, impossible to determine from the thickness or thinness of the layer of renal substance that such kidneys are seen to possess at the time of operation just what amount of functional activity may be left to them, but we can give a pretty good guess at it, and if in our judgment it is very doubtful if the first kidney opened has enough sound secreting substance to enable it alone to sustain life, we should, in the writer's belief, at once operate upon the other kidney. In so doing, we may, it is true, fail to save the patient's life, but we shall have given him his best and often his only chance of life by putting in commission again all the available functionally active renal substance that he possesses.

If, on the contrary, the first kidney has a good amount of renal substance which is apparently free from disease, the indication *not* to operate upon the second kidney would be equally clear, since the better the condition of the first one, the less likely will it be that there is any functional value in the second one, and correspondingly the less the advantage to be gained from operating upon it.

The above propositions appear to be simple and logical, and so obviously true that it would scarcely seem worth while to present them, were it not for the fact, so far as the writer can learn, that he is the only surgeon who has acted upon them.

The question which arises when considering these propositions is how often, if at all, are the conditions just stated likely to be encountered.

In calculous anuria, apart from those instances in which the condition is brought about by anomalies of the kidneys or ureters, one of the three following reasons is generally stated to be the causal factor: (1) The simultaneous blocking of both ureters by calculi of both sides; (2) the blocking of one ureter, the other kidney being absent; (3) the blocking of one ureter, the other kidney being so far diseased or destroyed as to be functionally useless.

The suppression of the function of a normal kidney with an unobstructed ureter, by reflex influence, originating in the blocking of the ureter of its fellow organ on the other side, is denied by many observers. In parenthesis it may be said that there are very few cases in which the occurrence of this phenomenon has been demonstrated. Four at least are well authenticated, however.

But comparatively little mention is made of the not very common, but still very important cases in which the suppression of the function of the unobstructed kidney takes place because of the calculous obstruction of its fellow, when the unobstructed organ is in varying degrees diseased or disabled in its functional capability, but not wholly destroyed, possessing a lessened but by no means unimportant functional power could it be set free.

With regard to the frequency of bilateral calculus, we have realized since the use of *x*-ray photography that these cases are much more common than had previously been supposed. They may be estimated at 30 per cent. of the total number of cases of renal calculus. This estimate is based upon the reports of 231 cases of renal calculus made by Albarran, Legueu, Morris, Kummel, and Kraft. The first two place the number as high as 50 per cent., Morris as low as 10 per cent., but the average in the 231 cases referred to was 30 per cent.

Now, if we put together all the cases of bilateral calculus, those in which the unobstructed kidney when it is more or less diseased and has had its function suppressed by reflex influence, but in which it is by no means incapable, and the small contingent in which the surgeon may have operated by mistake upon the most damaged of the two organs instead of the least injured one, there is a considerable number in which, if the operator rests content with having laid open one kidney, he will not have liberated all the functionally capable renal substance which is possessed by the individual, all of which he assuredly needs. In such circumstances, the writer believes,

the second kidney should at once be laid open if the patient's condition makes it proper to do so.

Before the operation, in cases of bilateral calculus with anuria, the surgeon can never be entirely confident which of the two organs is the more seriously damaged, unless he has had the aid of an *x*-ray picture taken by an expert in photography of renal calculi or unless the functional capability of each kidney has been established by means of the ureteral catheter, before the advent of anuria, or after anuria has occurred, by detecting by the same means a calculus in both ureters.

In practice we shall frequently be deprived of the aid of these procedures, for the condition is one of the most serious of surgical emergencies, and when the surgeon is called in no time can be lost in making such examinations, even if an expert *x*-ray photographer should be available, which is usually not the case. The cases in which the ureteral catheter will render valuable service are also few.

In most instances we shall have to depend on the physical examination and the history of the case alone, and the chances of being misled, more particularly in cases of bilateral calculus, are considerable, because of the absence of characteristic evidence, which, were it present, would enable us to determine whether calculus exists on one or both sides, and if on both, which of the two kidneys has received the least damage.

In the unilateral cases also there will always be a certain number in which the operator must be in doubt whether the first kidney operated upon will alone be capable of sustaining life after having been freed of its obstruction. The ones in which the greatest uncertainty is likely to arise are the non-infected hydronephroses which have but a small amount of good secreting substance left in them, for we all know how long such apparently inadequate amounts of renal substance are nevertheless capable of doing enough work to keep the patients alive and in reasonably good condition. With the

infected renal retentions of calculus origin, the operator will feel less doubt as to the functional incapability of the organ, for a well-marked infection will render unfit for service what appears to the eye to be a considerable amount of renal substance, while, on the other hand, what seems to be an entirely inadequate quantity will sometimes, if not infected, be capable of sustaining life. In the infected cases, therefore, there should be less hesitation, when the operator is in doubt, in cutting into the second kidney at once than in the non-infected ones.

A study of the cases of unilateral renal calculus with anuria shows that in the larger number of them the organ of the opposite side is either absent or totally destroyed functionally. In the minority—*but an important minority*—there is more or less disease or destruction of the secreting substance of the unobstructed kidney, but enough of it is left intact to contribute importantly to the sum total of renal activity, if its function were reëstablished.

In a few instances the unobstructed kidney has been normal. There are at least four such cases authentically reported. The reflex suppression of a normal kidney has been denied by a number of observers and affirmed by others.

That the sudden obstruction of the ureter of one kidney produces total suppression of the function of its fellow organ when the latter is extensively injured or diseased is an unquestioned fact, and though less well recognized it is also true when the disease in that kidney is but moderate or very little. That this should not happen more often in cases of calculous anuria is rather surprising, when it is remembered that the same thing takes place in the remaining kidney after nephrectomy, if that kidney is more or less diseased, and that urinary suppression occurs as the result of operations upon other parts of the urinary tract or elsewhere in the body, even in some cases when the operations have been trivial in character.

Just what the number of cases may be in which the first kidney operated upon will be found to be so diseased as to make it proper to lay open the second one, on the chance of

freeing an additional amount of functionally active renal substance sufficient to contribute importantly to the chance of saving the patient, it is impossible to say. The point which the writer wishes to establish is merely that the probability of being able to do this by cutting into the second kidney should be judged largely by the amount and condition of the renal tissue found in the first one laid open, and whenever it is seen to be but very small in amount, or if it is seriously infected and suppurating, even though it be somewhat more in actual quantity, that the surgeon should then give the patient whatever chance of benefit may be derived from cutting into the second kidney at once, unless, of course, previous examinations with the ureteral catheter have already demonstrated the absence or total destruction of the kidney on the other side.

In conclusion, the writer would also urge the performance of *bilateral nephrostomy at one sitting* in cases of bilateral renal calculus without anuria, as well as in those with it, except the patient's condition be such as to make the longer time required for opening the two kidneys an obviously improper danger to which to submit him.

So far as the writer is aware, this procedure has been done only by himself. (The case is one of those described at the end of the communication. The patient made an uneventful recovery.) In Wagner's contribution to the *Handbuch der Urologie of Frisch und Zuckerkandl*, he says that the calculus should be removed from the second kidney always, then, underlining the words, he adds, *but never at one sitting.*

On what principle this advice is given, and why this custom has invariably been followed with the one exception mentioned, the writer is at a loss to understand. It is not based upon actual experience of bad results obtained from having done the operations simultaneously upon the two kidneys, since the writer's case which has not been published is the only one, and, as has been said, the patient made an uneventful recovery.

The only objection to the procedure that could reasonably

be made is that shock might be too great if both kidneys should be operated upon in one sitting. This objection has not been sustained in the three cases in which the writer has operated upon the two kidneys at one time for three somewhat dissimilar conditions, nor is it borne out by such experiences as we have of the bilateral simultaneously performed renal operations, such as nephropexy and decapsulation (sometimes with nephrotomy added).

On the other hand, in these bilateral cases without anuria there *is every reason for removing* the calculi from both kidneys at the same time, for why should suppuration—even in cases in which there is but an insignificant amount of functionally capable renal substance present in one or another of the organs—be allowed to be perpetuated by the presence of a calculus, and why should either kidney, if functionally capable substance *is* present in it, be subjected to the destructive influence of a calculus any longer than need be. For which reasons the stones, unless of insignificant size in one of the kidneys, should be removed at the same time from both organs in cases of bilateral calculus with or without anuria, under the conditions named.

Appended is the report of the writer's cases which have direct bearing upon the subject of this communication, and also a table of cases of bilateral calculus in which operations were performed—with two exceptions—upon the two kidneys at different times, with an interval between the operations.

Case I.—A multipara, aged thirty-five years. Hematuria and pyuria had been present for about three weeks before her entrance into the hospital, and were accompanied by marked vesical tenesmus and frequent micturition. There was also at that time a good deal of phosphatic sand in the urine. Up to that time she had never passed renal calculi nor had any kidney pain.

The general condition was good and there was little or no fever. The urine contained a nearly normal quantity of solids;

the sediment was large. It consisted of pus, a moderate amount of blood, a good deal of thick stringy mucus, vesical epithelium, a large number of crystals of triple phosphates, and phosphatic sand.

The urine was ammoniacal.

No tenderness or enlargement of either kidney. Appetite good; no constitutional disturbance.

Cystoscope showed what was believed to be a partly necrotic papilloma of the bladder, with long villi floating far out from the vesical wall.

The hematuria became much less after the patient had been in bed for a few days.

Operation: Suprapubic Cystotomy. A large mass was found occupying the interior of the bladder and attached to the lateral wall (a little external to the orifice of the right ureter) by a pedicle about as thick as the thumb.

The pedicle of the supposed tumor was divided with the writer's galvanocautery scissors, a margin of the surrounding tissue being included in so doing, and the mass was removed. On examination it proved to be the entire inner lining of the bladder which had undergone necrosis and had involved a part of the muscular structure of the organ, so that it was partly detached from the surrounding tissue and gave the impression of the pedicle of a new-growth.

The bladder was drained and the incision healed slowly by granulation. The recovery was uneventful.

The patient remained well until about six months before her second entrance to the hospital. She then for the first time began to have more or less pain in both kidneys, and hematuria reappeared. She also had oliguria.

For three days before entering the hospital very little urine was passed, and for the last twenty-four hours there was complete anuria. Uremic symptoms began to be manifested on the day before her admission and were progressive.

Temperature, 102° to 103° F. Pulse rapid. Tongue coated. Bowels constipated. Occasional vomiting. Intellect

clouded. Moderate distention of abdomen and slight spasm of the muscles of the right side. Some tenderness in both flanks. Twitching of muscles of hands and forearms. General condition critical.

Operation. Third day of anuria, thirty-six hours after beginning of uremia. The patient was placed upon the abdomen across the inclined planes made by the Cunningham "kidney operating table." The right kidney was first exposed in the loin; it was found to be buried in a mass of connective tissue and was universally adherent. In separating it from this mass at the upper part of the organ, a large perinephritic abscess, communicating with the interior of the pyonephrotic kidney, was opened. In the pus which escaped were several fragments of phosphatic stone. The kidney was laid open parallel with and a little posterior to its convex border.

The organ was pyonephrotic and its secreting substance extensively destroyed. Enough of it, however, remained intact, it was thought, to be in some measure functionally capable. A perforation near the upper pole communicated with the perinephritic abscess. A large calculus lay in the pelvis and sent branches into the dilated calices. A part of the calculus only could be removed, owing to its intimate connection with the kidney.

While the writer's colleague, Dr. Blake, cleansed the operative field, sutured the wound in part, and arranged drainage, the writer laid open the second kidney and removed broken bits of calculus from it. The conditions on this side were similar to those upon the other; there was, if anything, a little less secreting substance in the kidney, and the stone was smaller. The calculi occluded the outlet of the renal pelvis of each kidney. The wound and drainage were arranged as on the other side. The operations occupied twenty-five minutes altogether.

Both kidneys began to secrete within three hours after the operations, the first one operated upon, abundantly, the second not so much. On the following morning the patient

felt decidedly better and the uremic symptoms had almost entirely ceased. This improvement was maintained for twenty-four hours. Uremia was then once more noticeable, and she died on the third day.

Shock played no part in causing death. No autopsy.

Case II.—A man, aged thirty-five years, in good general condition, who had had for a good while more or less characteristic evidence of renal calculus on the right side, and for the past year suggestive signs of it on the left as well.

X-ray pictures showed clearly a calculus in the right kidney and gave a doubtful shadow in the left one.

Operation. By mistake the first kidney operated upon was the one in which the doubtful shadow of the *x*-ray photograph had appeared. It was laid open after being exposed by the usual incision in the loin. Exploration of the interior of the kidney failed to discover a calculus. The renal and outer incisions were both closed tight by suture without drainage. The other kidney was then laid open and a calculus about the size of a chestnut was removed from one of the calices. The kidney was but slightly infected. The calculus had a smooth surface. A drainage tube was placed in the kidney and the renal incision was closed around it. The outer wound was closed except for a space sufficient to allow the passage of the tube. Drainage maintained for two days. Wound closed in a short time. The incision on the other side healed per primam. Recovery uneventful.

Cases III, IV, V.—These were all cases of bilateral renal infection with extensive suppuration.

The surgical intervention in the first of them was a simultaneously performed bilateral nephrostomy. Drainage of both kidneys. This patient made a good recovery without persistence of fistula.

In the other two cases unilateral nephrotomy only was done. Both patients died. Both had abscess of the other kidney. One of them would probably have lived had the second kidney been opened.

OPERATIONS DONE IN CASES OF BILATERAL CALCULUS.

Operations.	Cases.	Nature of operations.	Results.	Remarks.
Chevalier. . .	1	Unilateral nephrotomy.	R	Anuria of 14 days preceded operation.
Championnier	1	Unilateral nephrolithotomy.	R	Same for 13 days.
Deaver	1	Nephrolithotomy on one kidney. 18 days later nephrectomy on same kidney. 9 months later nephrolithotomy on other kidney.	R	
Deansley . . .	3	1. Nephrolithotomy on one kidney. 2 weeks later same on other kidney.	R	
		2. Unilateral nephrolithotomy. No operation on other kidney.	R	
		3. The same.	R	
Desnos	1	Unilateral nephrolithot.	R	Anuria 12 days preceding operation.
Duret	1	Unilateral nephrolithot.	R	Same 10 days.
Delbert. . . .	1	Unilateral nephrolithot. Second kidney same one year later.	R	Hydronephrosis of first—pyonephrosis of second.
Kummel . . .	16	5 with anuria—Unilateral nephrolithotomy.	3 D 2 R	
		11 without anuria, same operation with second kidney done after an interval in each case.	9 R 4 D	
Grohe.	1	Unilateral nephrolith on one kidney and same on other after 15 days.	R	
Mixter	1	Same—second kidney done six months later.	R	
Tuffier	1	Same and later, at two intervals, same on second kidney.	R	
Verdi	1	Same. Calculus passed. Spontaneously from other.	R	
Watson . . .	2	Simultaneous bilateral nephrolithotomy in both.	1 D 1 R	Anuria in fatal case.
Young	1	Unilateral nephrolithot.	1 D	See cases 1 and 2 reported above

Total 32. Deaths 9=27.9 per cent.

MENSURATION IN URINARY DISEASES.

By Howard A. Kelly, M D.,
Baltimore.

Every specialty passes of necessity through three phases: (1) Of dawning knowledge, (2) of increasing accuracy of observation with differentiation, and (3) the adoption of methods of registration.

A specialty may be said to have reached its acme when its followers habitually record their observations in such terms that (1) any changes in the course or character of the disease are easily recognized, and (2) other observers are enabled to form an accurate mental picture of the disease and so utilize experiences other than their own. It would be impossible to overestimate the value of this amalgamation of experiences of the many by the individual in furthering the progress of scientific medicine. I think most of those here will agree with me that much of our medical literature is often rendered valueless by a colorless description of cases, giving them no marked individuality.

Several factors conspire in our descriptions of morbid processes to make a perfect picture:

1. The pictorial art itself, whether the work of the artist or photographer. It is because this valuable adjunct to our work is so perfect, so literal, and so unbiased a presentment of a case, that it has been warmly welcomed and widely used ever since the first crude pictures were employed a little over four hundred years ago. I think you will agree with me that we

may congratulate ourselves upon an extraordinary improvement in this branch of art within the past decade.

2. I note a growing tendency toward fuller descriptions of cases, albeit there is much yet to be desired in clearness and power of description. This fault is due to the fact that men aspiring to be scientific often hold literary qualities and finish in too little esteem. The scientist who lacks grace and charm and finish in his writing may be compared to a powerful but clumsy athlete, or a man with strong vision but only one eye.

3. Lastly, we need more instruments of precision in connection with the recording of cases, instruments which exclude vagueness and the element of personal bias as far as possible. We have but few such and they are readily named: The thermometer; the microscope; the hemaglobinometer; the esthesiometer; the various refraction instruments of the ophthalmologist; the electric testing instruments for determining the condition of muscles and nerves; and to these I may add the piezometer to measure resistances and sensitiveness, and in vaginal work, the calibrator.

It is with a view of extending the field of accurate measurements into the dominion of urology, that I desire to speak today.

I propose to describe methods of mensuration by which the comparisons between disease and health can be more accurately made, and utilized to the great advantage of the specialist, as I shall briefly show in each case.

It is for several distinct reasons that I wish to urge the application of mensuration in the study and record of diseases of the urinary organs:

1. *For Reasons which Benefit the Examiner.* The time and care given to the work develop greater accuracy and familiarity with the field, thus proving of immense value to the specialist; in fact such an investigation ought to make the difference between him and the tyro.

2. *For Reasons of Diagnosis and Treatment.* (*a*) A different picture of the disease is obtained, for it is thus recognized as a part of a process advancing from a mild to a more serious stage; the individual examination becomes, as it were, one view in a kaleidoscopic series. (*b*) This familiarity with every stage of the disease makes possible its recognition in very early stages, where otherwise it would be overlooked and left to advance. (*c*) The accurate differentiation of stages of a disease makes possible the application of various methods of treatment suitable to each stage, and at the beginning simpler methods are applicable.

3. *The Benefit which Accrues to the Record and the Consequent Transference of One Observer's Findings to Another.* In a given case where measurements have been used throughout, one can estimate the progress of the case toward cure; or at any moment determine just what has been accomplished and also state definitely when cure is effected.

The methods of mensuration applied to the urethra, the bladder, the ureters, and kidneys are: Linear, angular, volumetric, and tensometric measurements (excuse the hybrid word). By means of these the capacity of the bladder is determined, whether contracted, expanded, or normal.

The location and extent of vesical lesions are measured accurately:

Vesical, diverticula, scars and trabeculæ.

The distances of the ureteral orifices from the internal urethral orifice.

The angular direction of the ureteral orifices from the axis of the urethra.

The exact length of each ureter.

The tightness of a urethral or a ureteral stricture, as well as its caliber.

The location of a stricture in a ureter.

The location of a stone in a ureter.

The exact capacity of a renal pelvis with its calices.

The normal of the bladder distended with air in the knee-breast position has been determined in from 11 to 23 cases in the following manner: A graduated urethral speculum, such as is here shown, 14 cm. long from the vesical end to the outer rim, is introduced into the bladder which is then emptied by suction of all its fluid. The bladder is afterward illumined by reflecting a light into its interior with a head-mirror. The speculum is then withdrawn until the internal orifice of the urethra just begins to appear and to close over its end. The length of the urethra is next measured by reading the length of the speculum outside the body, and deducting this from its entire length. In 10 cases, the average urethral length was 4.5 cm., the shortest being 3 cm., the longest 5.5 cm. Luschka gives 3 cm. as the average, and Sappey the same. Keeping the speculum in this same position, a long metal centimeter measure is now introduced into the bladder until it touches the posterior wall. The distance the measure has entered is read off at the outer rim of the speculum. When deducting the length of the speculum, we have the distance of the internal urethral orifice from the posterior or sacral wall of the bladder, or the extension of the bladder in this direction.

In 23 cases the average distance from the urethra to the posterior wall was 6 cm., the greatest being 8.5 cm., and the smallest in a normal bladder, 5 cm.

Raising the speculum high up to an angle of about 50 degrees with a horizontal plane, another important measure is taken to determine the distance of the vertex of the bladder from the internal urethral orifice. In 11 cases I found this to be 5.7 cm. On an average the greatest extension in this direction was 7.5 cm., while the smallest was 4.75 cm. These measurements were made in normal bladders.

If the speculum is turned well to the right and then to the left, taking care that its end rests at the internal urethral

orifice, the cornua of the bladder are seen. The average distance to the right or to the left cornu is a little over 5 cm. The greatest distance 7 cm.

The distance from the external urethral to the ureteral orifices in 19 cases averages 7.1 c.m., the longest distance being 8 cm. If we deduct from this the length of the urethra, we have an average distance of the ureteral orifices from the internal urethral orifice of 2.5 cm. In comparing the observations of Luschka, Quain, Sappey, and Henle with my own, I find Luschka gives the anteroposterior diameter as 10 cm. in a distended bladder, while Sappey estimates it as 8 cm. It will be seen that these measurements are from 4 to 2 cm. greater than my own. I am inclined to consider my own as more accurate, because in examining the patient in the dorsal position, and distending the bladder with fluid, it is not possible to state just when the bladder is being distended or the degree of distention, while in my own measurements with no fluid, but with air in the bladder, the walls simply drop apart under the influence of atmospheric pressure, and no distending force whatever is exerted. The value of these measurements is seen when we come to investigate the question of contracted bladders. My mensurations of the bladder in the knee-breast posture, particularly when made under an anesthetic, clearly show that a great many cases labelled contracted bladders by physicians who have had them for months or years under treatment have merely been cases of intolerant bladders, as upon putting them into the knee-breast position, the walls of the bladder have dropped well apart, and the organ has assumed its normal dimensions as determined by the methods given above. I believe a true contracted bladder to be rather rare. I present here, in comparison with these normal measurements, 2 cases of contracted bladder at present in my hands.

Marked by Contracted Bladder due to Cystitis and Pus Kidney. Illustrative of Small Measurements.

Miss J. P., aged fifty-eight years. San. No. 2371.

Diagnosis. Ulcerative cystitis, pyonephrosis, right.

Operation. Right nephrectomy, formation of the vesicovaginal fistula. The family history was markedly tuberculous. Frequency and pain on micturition and loss of weight was complained of. In the spring of 1895, an attack of painful micturition lasting two days. In 1897, a similar attack, pus being found in the urine and in 1903 another attack which persisted and grew worse, for in addition to the frequency there was great tenesmus and pain. Various forms of irrigation of the bladder and a vesicovaginal fistula which she had for six months were equally valueless, but formalin applications gave her some relief. Christian Science was attempted for a while without any benefit.

A general examination showed the patient fairly well nourished; no disease of heart and lung. The urine contained a large amount of pus, colon bacilli, and some blood.

Special Examination. Neither kidney nor ureter were palpable. The bladder was found greatly contracted and covered with ulcers. The measurement to the posterior wall was 2 *cm. That to the vertex* 2.25 *cm.*

At the operation March 12, 1907, a lobulated cystic kidney was removed whose structure had been entirely destroyed. The pelvis and calices were greatly dilated. The ureter was somewhat dilated but sewn into the lower end of the incision.

On March 28, a vesicovaginal fistula was made. This patient is still under treatment (1907).

Case Illustrating Contracted Bladder Measurements and those of Diverticulum Showing very Small Bladder Measurements.

Miss C. E., aged forty years; April, 1906. San. No. 2192.

Diagnosis. Tuberculosis of the left kidney, ureter, and bladder.

Operation. Left nephrectomy.

The family history was negative, and good health had been enjoyed until the present trouble. Great bladder distress, frequency, burning, and blood in the urine was complained of and the present illness had lasted one and one-half years, beginning with slight increased frequency of micturition which gradually grew worse for six months, with such excruciating pain that she was incapacitated for work as a school teacher. There was never any pain in the kidneys.

General physical examination showed slight evening rise of temperature above normal; hemoglobin, 50 per cent.; no evidence of tuberculosis in chest or elsewhere. Patient thin and delicate looking.

Special Examination. Right kidney palpable, the left kidney cannot be felt; right ureter normal; the left thickened and tender. Bladder greatly contracted, its expansion 4 c.c., but 50 c.c. of fluid injected causes pain. There is superficial ulceration: 20 c.c. up left ureter an impassable stricture met; in forty minutes there was no flow from this ureter. The right kidney secreted 18 c.c. in twenty minutes, the urine being normal. On removing catheter from left kidney, a piece of tuberculous material was drawn away in its eye. The operation was made in the usual manner, both lumbar and inguinal incisions being employed which incisions healed perfectly within six weeks.

Postoperative Measurements. Bladder: Posterior wall, October, 1906, 2.2 cm.; March, 1907, 1.5 cm.; April, 1907,

2.5 cm. Vertex, October, 1906, 1.5 cm.; March, 1907, 1.2 cm.; April, 1907, 1.5 cm. Left cornu, April, 1907, 4.2 cm. Right cornu, March, 1907, 2.7 cm.; April, 1907, 2.7 cm.

Loculus in Bladder. On posterior wall: Long diameter, 3 cm.; transverse diameter, 1.3 cm.; depth, 2 cm.

Again, abnormalities within the bladder can be measured with considerable accuracy in the following ways: In the first place, a diverticulum in the bladder can be determined by measuring first the distance from the internal urethral orifice to the margin of the diverticulum, either by carrying the speculum from the internal urethral orifice to the diverticulum and noting on its graduate cylinder the distance travelled, or by resting the end of the speculum at the internal urethral orifice and introducing a graduated rod as far as the edge of the diverticulum, measuring the distance on the top at the outer edge of the speculum, and subtracting the length of the speculum, gives the distance to the diverticulum. Then carrying the rod into the bottom of the diverticulum, the additional distance traversed is easily measured.

Case Illustrating Measurement of Lesion.

Miss R., May 7, 1907. San. No. 2443. Urethra, 4 cm. long; posterior wall, 2 cm.; vertex, 2 cm.; angle of vertex, 35 degrees; left cornu, 3 cm.; right cornu, 3.75 cm.; cornual angle, 30 degrees.

Transverse lesion in vertex, beginning with an area of ulceration in left cornu. Size: Five diameters of speculum, transverse at reflexion from vertex to posterior wall. Right ureteral orifice from interior of urethra, 1.5 cm.; angle right ureter, 35 degrees; angle left ureter, 35 degrees; catheter entered right ureter for 24 cm.

LINEAR MEASURE. ULCERS.

In measuring scars or trabeculæ or the size of inflammatory patches or ulcers in the bladder it is only necessary to know the exact diameter of the end of the speculum in millimeters and to bring this close to the lesion to be measured, then to lay it off on the diameter as the instrument is moved from side to side. The outer edge of the speculum each time is turned to occupy the position just held by the inner edges, in this way forming an imaginary row of tangential circles, as shown in the figure. Knowing the size of the lumen of the speculum, one can easily subdivide this by imaginary lines, say in a speculum 1 cm. in diameter, a line traversing its centre divides the area into parts, say 5 mm. each, and by subdividing these again it is easy to estimate even in millimeters. It is not necessary to touch the lesion to do this; the speculum may be kept 1 cm. or more away. While thus traversing the wall of the bladder with the end of the speculum, the lesion may be plotted out and recorded in a greatly enlarged figure if desired, say three to four times normal size. One should always carefully note whether lesions are on the posterior or sacral surface, in the vertex which is inferior in the knee-breast position or the lateral walls, on the base or anteriorly on the pubic area, or retrosymphyseal.

ANGULAR MEASUREMENTS.

While the measurements given are exceedingly valuable in determining accurately the size and location of lesions as well as the capacity of the bladder, they are not sufficient to give the form of the bladder. This must be determined by the addition of a series of angular measurements to be made in the following way:

It is necessary to have two arms pivoted together at the end with which to make an angle and a graduated half circle with which to measure it. The angles are all measured from the horizontal as being most convenient.

Let me illustrate: The measurement to the posterior wall is a horizontal measurement. The speculum is then raised until its inner end is seen at the vertex. If one of the two arms is held horizontal the other is then dropped until it falls to the same angle as that in which the speculum lies, or it may be even introduced into the speculum, when the screw is set to fix the angle. The instrument is then withdrawn, the angle measured on the graduated half circle. I propose having these arms cross, and the graduated half circle set on the arms, when the angle can be measured at once. In a similar manner the angles of the cornua may be measured either from a vertical or horizontal arm. The distance of the base above the horizontal is also measured. Let me describe the utility of this procedure in plotting out a bladder.

Mrs. B., aged thirty-nine years, May, 1907. San. No. 2440. This patient had been treated for ulceration at the junction of the posterior and baffondal walls of the bladder without relief. Some years ago she was treated for urethritis by putting a silver stick directly into the urethra. This caused sloughing of the entire urethra and complete loss of control of the bladder. To repair this a number of operations were done, and, finally, a regular spout-shaped urethra was made. A pledget of cotton underneath this gives her fairly good control. Examination of the bladder showed it healthy except for the ulcer, which was 30 mm. long by 21 wide.

Operation Measurement. The bladder measurements were: Urethra, 5 cm.; sacral wall, 3 cm.; vertex, 5 cm.; left cornu, 3.5 cm.; right cornu, 4 cm.

The angular measurements were as follows: Vertex, 50 degrees; left cornu, 25 degrees; right cornu, 25 degrees.

The angulation and distance of the ureteral orifices is a

matter of extreme importance both in searching for the openings and in determining the presence of disease. A markedly diseased ureter is often retracted toward the cornu and drawn away a greater distance than its fellow from the internal urethral orifice. The orifices are often so distorted that one lies close to the median line, while its fellow occupies an extreme lateral position and it is of great interest to the specialist to notice all these asymmetrical cases.

NOTE.—In getting ureteral length, add length of catheter outside of speculum to length of speculum and deduct the sum from the total length of catheter.

Measurements in a normal case. Ureteral length equal 2.3 cm.

Miss B., May 3, 1907. San. No. 2438.

Bladder Measurements: Urethra, 3 cm.; posterior wall, 4.5 cm.; vertex, 6 cm., later, 7 cm.; left cornu, 7 cm.; right cornu, 8 cm.; left ureteral orifice from internal urethral, 4.25 cm.; right ureteral orifice from internal urethral, 4.5 cm.; length of ureter, 25 cm.

Angular Measurements: Left ureter, 35 degrees; right ureter, 35 degrees; vertex, 45 degrees; base, 20 degrees; each cornu, 27 degrees.

URETER LENGTHS.

The measurement of the length of the ureter ought to be made as a routine practice whenever the ureteral catheter is introduced. This is easily done: The ureteral orifice is exposed, the catheter stripped from its stilette into the ureter, which it ascends until it touches the top of the renal pelvis. The experienced urologist recognizes this point by an almost imperceptible check in the progress of the catheter. He then stops at once for fear of bruising the pelvis of the kidney and causing hemorrhage. There are *two ways of determining* the

length of the ureter plus the renal pelvis. One is with the vesical end of the speculum resting in the angle between the catheter and the bladder wall at the ureteral orifice, to measure the length of the ureteral catheter still outside the speculum. If to this be added the length of the speculum and the sum of these two figures is deducted from the known length of the catheter the distance the catheter has passed in ascending the ureter is easily determined. The other way is to withdraw the speculum and measure the length of the catheter outside of the body. Previous measurements have determined the length of the urethra and the distance from the urethra to the ureteral orifice. These three measurements being added together and deducted from the known length of the catheter, the length of the catheter inside of the ureter is ascertained (see drawing).

Out of 20 *cases thus measured, the average length was* 24.7 *cm., the longest ureter being* 30.5 *cm.* This differs to a remarkable degree from Quain's measurements given in his *Anatomy,* vol. iii, pt. 4, p. 204, where he states the ureters to be from 14 to 16 inches long, which is 35 to 40 cm. The difference is all the more marked when it is remembered that my own measurement includes the length of the pelvis of the kidney. Luschka estimates the length of the ureter (*Anatomy,* vol. iii, p. 294) as 27 cm., also greater than my measurements. Sappey's are closer; he states the ureteral length to vary from 25 to 30 cm. (*Traité Anatomie Descriptiv,* vol. iv, p. 529, fourth edition).

The measurement of the length of ureter or more particularly the measurements of the *lengths of the left and right ureters in the same person as a basis of comparison is a matter of extreme importance in some renal and ureteral diseases.*

For example, in one of my own cases (*Operative Gynecology,* vol. i, p. 530) where there was fistula in the left groin, supposed to be due to carious vertebræ, in making a vesical examination I passed a renal catheter 26 cm. on the right side.

The catheter stopped gently in the usual manner. On the left side the catheter stopped abruptly, and only passed in 23 cm. and could not be coaxed farther. The urine flowed freely from the right catheter; none at all flowed from the left, although the catheter remained in situ over an hour. In this way I diagnosticated the presence of an old abscess of the left kidney and operated and relieved the patient, who has remained well since and is now married.

I have employed with success, in several cases of ureteral stone, a method which was originally suggested by Dr. Sampson, then my resident at the Johns Hopkins Hospital, and now gynecologist to the Albany Hospital. This consists in waxing the entire ureteral catheter, and passing it up to the kidney. On withdrawal, if a stone is fixed at some point in the ureter, there will be a scratch mark extending from the tip to this point and by measuring the length of it, one can determine the distance from the kidney, and also by employment of the other measures the distance from the ureteral orifice. By observation of the curves of the catheter an accurate estimation can be made as to just where it is located. An illustrative case of long-scratch mark is that of a patient who came to me complaining of severe pain.

Mrs. A. B., aged thirty-seven years; October 15, 1906. San. No. 2232. Severe pain in pelvis and in right side. The family history was unimportant (rather neurotic and eccentric), the patient well and healthy until marriage eight years before; there had been no children nor miscarriages. Inquiry elicited the fact that from marriage she had contracted severe genital and urinary gonorrhea and there were a number of hemorrhages from the bladder. In June, 1903, she had appendectomy and suspension of the uterus by Drs. F. and R., and in May, 1905, she had the right tube and ovary removed in Germany.

Physical examination showed a strong, healthy woman; no

fever; urine normal. Special physical examination, marked pelvic inflammatory disease.

Operation. By abdominal incision a markedly inflamed left tube and ovary. Uterus removed. Kidney and ureter examined and found normal. Patient convalesced rapidly and completely from this operation, but continued having some pain.

Measurements. January 11. Urethra and bladder are normal in appearance and the urine is normal; right ureter was entered by wax-tipped catheter 26 cm.; the pelvis contains 17 c.c. fluid. January 23, pelvis contains 23 c.c. fluid. February 19, 1907, right ureter 25.5 cm. long. Catheter wax tipped, a scratch on it 18 cm. long. By this the stone must have been up ureter 7.5 cm. Scratch probably an artifact.

Diagnosis of Tuberculous Kidney made by Finding a Stricture. Case in which a Strictured Left Ureter due to Tuberculosis Gave a Pull of 200 grams to Loosen a Catheter which had been Introduced in the Stricture.

Mrs. E. H. C., aged forty-six years; October, 1906. San. No. 2302. The family history was good. The patient always very delicate, and when eighteen years old had a severe cough lasting for months followed by an attack of pain in left kidney region. A year later she had a great deal of bladder trouble which lasted for several months, but since that time there had been no trouble with the bladder. Since September, 1906, the patient had not been very well, nervous, and some pain in the rectum, while doctors had found tubercle bacilli in the urine. Temperature and pulse generally normal.

Physical examination showed the patient well nourished, but extremely nervous. The urine was found to contain tubercle bacilli; heart and lungs normal, the uterus, however, being the seat of a large myomatous mass. There was no

elevation of temperature during her stay of several weeks in the hospital.

Special Examination. October 29, *the bladder was catheterized and the following measurements were made: length of urethra,* 4.25 *cm.; from external urethral orifice to right ureteral orifice,* 5.5 *cm.; to left ureteral orifice,* 5.5 *cm.* The bladder is perfectly normal appearing as are also the urethral orifices. *The left ureter was catheterized and a few centimeters up an impassable stricture was met. The right ureter was easily catheterized along its entire length. The left and the right kidney were found secreting at about the same rate, and the left kidney as well as the right was secreting normal urine chemically and microscopically. A striking feature in view of the fact that the bladder constantly contained some pus cells and red blood cells and no organisms except tubercle bacilli.* (Unfortunately no measurements were taken.)

There was a pull of 200 *grams by the stricture of the left ureter.* The reason that the left kidney was secreting clear urine at this time was explained by the condition of the kidney after its removal. It was found that the tuberculosis was limited to the pyramids of the anterior half of the upper pole. The calices supplying these pyramids were very tuberculous, whereas all the rest of the kidney, including both the secreting structures and the pelvis, was normal. On palpation the lower end of the ureter was thickened and tender, but the upper end was not tuberculous, as shown at operation.

On the finding of a stricture at the lower end of the ureter a diagnosis of tuberculosis of this kidney was made and on October 19 *a nephrectomy by lumbar incision was carried out.*

This patient has done perfectly well since her operation in spite of the large myomatous uterus.

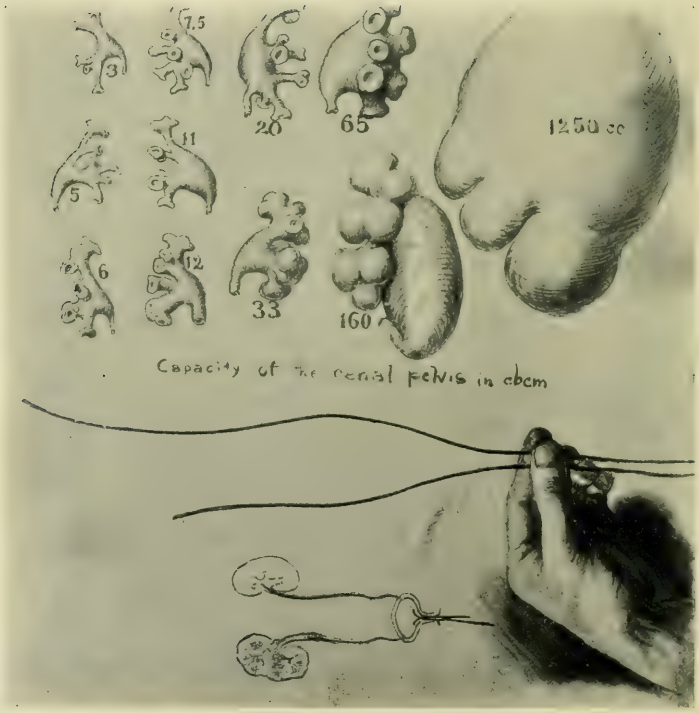


FIG. 1.—Shows above the relative size of renal pelves from 3 to 1250 c.c. actually made by plaster cast. The lower part of drawing illustrates the measurement of ureters and the finding of the stricture in the right ureter.

Where Measurement Disclosed a Stricture in the Ureter.

Mrs. L. B. C., aged thirty-eight years; May 5, 1906. San. No. 2176.

Diagnosis. Tuberculosis of the right kidney, ureter, and bladder.

Operation. Right nephroureterectomy. Complaint: burning and frequency of micturition.

The family history was negative and her past history showed, in 1892, tuberculosis of the rib and pleurisy, and at the present time tuberculosis of the ankle. The patient was a well-nourished, healthy-looking woman, with no fever or evidence of pulmonary tuberculosis.

On special examination neither kidney was palpable. Right ureter thickened and tender. Left, normal to palpation. *Bladder diffusely inflamed. Right ureter catheterized, catheter only goes up 23 cm. from external urethral orifice, whereas catheter goes up 33 cm. in the left ureter. Urine containing 2 per cent. urea and without pus or bacteria obtained from the left kidney. In twenty minutes there was no flow from the right kidney.* From the bladder urine was obtained tubercle bacilli. By a lumbar incision and then an inguinal incision, the kidney and ureter were removed. This patient has improved greatly since operation, her bladder having ceased to give symptoms and urine become almost normal.

As no urine was obtained from the left kidney, the stricture was a most important finding.

This method is also of great value in cases of congenital *misplacement of the kidney* or of displacement of the kidney with *large hydronephrosis* in which the ureter is shortened and flattened on the sac so that the catheter cannot enter the usual distance. If the catheters are inserted into both sides in such cases and then grasped firmly at the external urethral orifices and withdrawn simultaneously a striking picture is secured (Fig. 1).

A great deal is to be learned from the *form impressed upon the catheter* by the moist warm tissues of the body after it has been left in the ureter at least a few minutes. If a good, fairly soft catheter is used and on removal is immediately laid upon a cold surface, such as a sheet of glass, in normal cases the catheter assumes a characteristic form with two gentle curves at average distances of 15 cm. and 22 cm. below the tip (Fig. 2).

Alongside of this normal catheter, I give several illustrations of the effect upon the curves of the catheter wrought by introducing it into abnormal ureters. A large hook-shaped curve was obtained from a pus-kidney case which I had many years ago, the second one being from a woman upon whom I operated for hydronephrosis at the Johns Hopkins Hospital in March, 1906.

A third type is shown where there is a sharp angulation of the upper end of the catheter, due probably to its entering a calix. Such an angulation would, of course, seriously interfere with the outflow of urine, and it is this condition perhaps that we have in cases where we diagnosticate a plugging of the eye of the catheter, and yet, on drawing it out a little way, the flow begins.

The tightness of a stricture of the ureter is measured by a delicate tension instrument which I have made and which works in the following manner: A string is fastened on to the ureteral catheter, caught in the bite of the stricture, and is passed over the pulley in order to secure a vertical pull. The instrument is then hooked into a loop in the string and pulled upon until the catheter begins to move, the maximum tension being noted. In a case of tuberculous stricture I found the pull was 200 grams. The size of the catheter must always be noted, as the larger the catheter the stronger the bite. The value of this method is twofold: in the first place it gauges accurately the degree of stricture and enables different observers to make accurate comparisons between their cases,

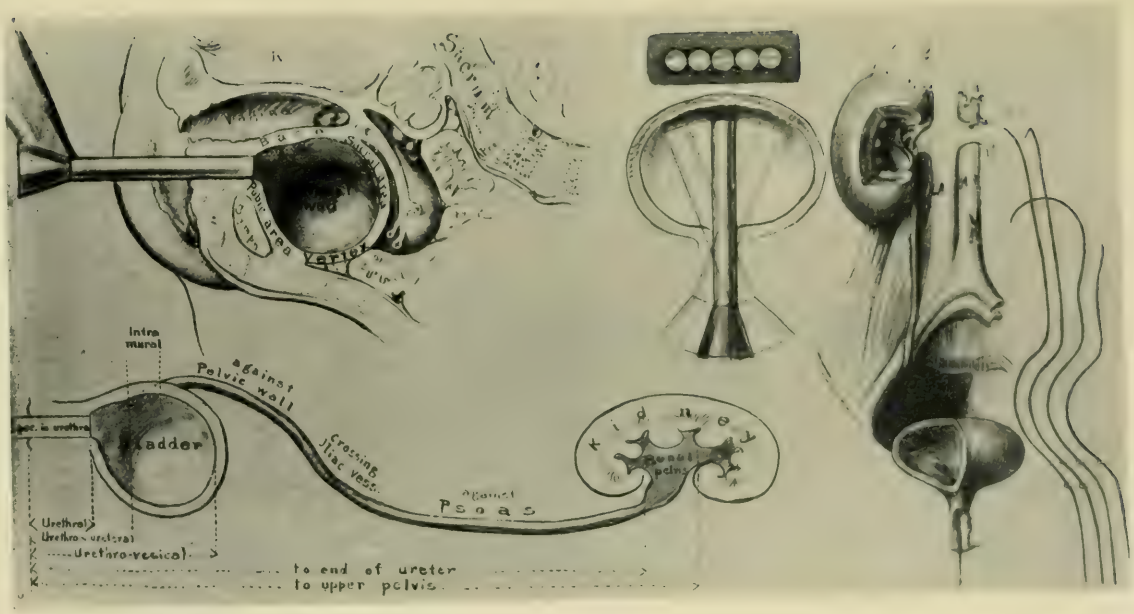


FIG. 2.—To the left and below is a diagram showing the various linear measurements. Just above this is a drawing illustrating the various surfaces of the bladder. In the centre of the picture the figure illustrates the method of measuring a vesical lesion. The figure to the extreme right shows the normal curves of the ureter and some catheters to show marked abnormal bendings.

which has hitherto been impossible; it also enables the observer to test improvement as he treats a stricture by successive dilatations.

Miss W. Cystoscopic examination. In knee-chest position: Length of speculum, 12 cm.; urethra, 4 cm. long; sacral wall, 6.5 cm. long; vertex, 6.75 cm. long; left cornu, 7 cm. long; right cornu, 6 cm. long; angle at base, 22 degrees; angle at vertex, 55 degrees; angle left cornu, 40 degrees; angle right cornu, 45 degrees. Left ureteral orifice: External urethral orifice to left ureteral orifice, 6 cm.; angle of left ureter, 15 degrees. Right ureteral orifice: External ureteral orifice to right ureteral orifice, 6 cm.; angle of right ureter, 22 degrees. Catheterization of right ureter: Amount of catheter outside ureter, 47 cm.; as catheter is just engaged in stricture, length of catheter is 47 cm.; amount of catheter outside of ureter, 24.5 cm.; rest of catheter in ureter. Measure of pull with instrument, 180; maximum pull, 190; amount of catheter just outside of stricture is 42 cm.; length of catheter is 50.5 cm. to tip; no scratch mark.

Measurements of the capacity of the pelvis of the kidney are of the utmost importance. By means of these I have been able to discover a whole realm of renal affections, namely, the hydronephroses of lesser grade, beginning with slight distentions of the pelvis of the kidney and extending up to those holding as much as 1250 c.c. If a diagnosis of hydronephrosis can be made in the earliest stages, it is manifestly a matter of high importance, as the disease is then easily amenable to surgical treatment, while in the advanced stages of the disease, in which it is commonly recognized, often nothing can be done but extirpate the kidney.

The technique which I am now employing for grading the sizes of hydro- and pyonephrosis is essentially that which I have been using for some years, although there are constant small changes in instruments and in methods to facilitate the work.

After introducing a ureteral catheter into the pelvis of the kidney, accurate observation and recording of the character of the flow of urine and the amount of flow by minutes is made.

A large renal catheter measuring from 2 to 2.5 mm. should be used, as thus a good conduit is secured, and thus all reflux around the catheter guarded against. In case the kidney is a normal one, the urine after the first 2 or 3 c.c. will be observed to flow intermittently. There will be a systole bringing down a few drops of urine and then a diastole. In a dilated hydronephrotic pelvis the flow is very different; there will be a continuous drop, drop, drop, until the pelvis is emptied, and after that there will be a slow, sluggish dropping. The amount of flow from such a hydronephrotic kidney can also be very great within a short time.

Case Illustrating How a Kidney Stimulated to Hypersecretion May Give a Flow through a Renal Catheter, Simulating Hydronephrosis.

Mrs. L. S., aged thirty-three years; March, 1907. San. No. 2357.

Diagnosis. Closure of the ureter by a cancer metastasis in the neighborhood of the vesical end of the ureter.

Clinical Facts. This patient had been suffering with excessive hemorrhages and vaginal discharge for a number of months when she came to me in November, 1906. Examination showed her symptoms to be due to an extensive carcinoma of the cervix uteri. Although the case was a borderline one, it was decided to give her the advantage of doubt and an extensive abdominal operation along the lines suggested by Wertheim was performed. The left ureter was injured in this operation as it was stripped quite bare in order to remove all growth. Some weeks following operation there developed a

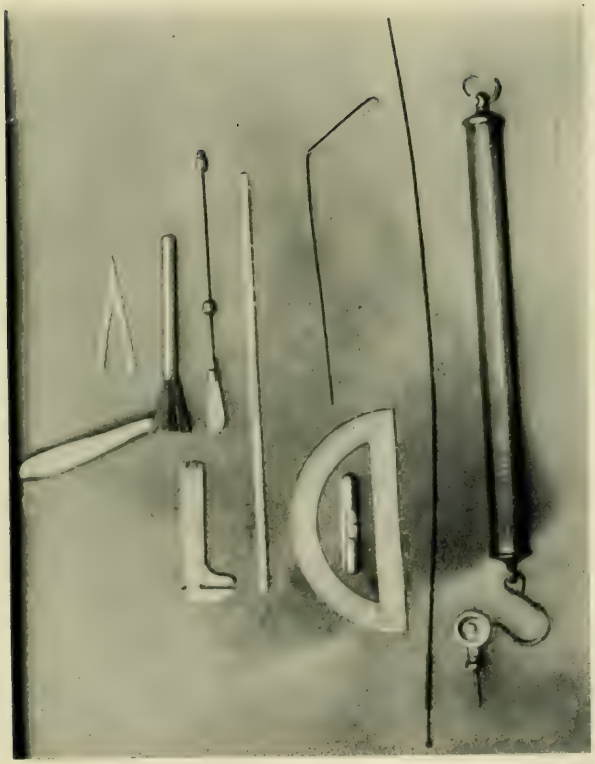


Fig. 3.—Instrument for measuring caliber and diameter of specula. V-shaped instrument. Sliding gauge for measuring diameter for small ureteral catheters. Semicircle for measuring angles in bladder. Level for establishing horizontal. Searcher for protracting ureter. Ureteral catheter with stylet and rubber sleeve on end. Spring balance to test bite of stricture on catheter.

fistula of the left ureter, through which the entire output of the left kidney escaped. This kidney became infected and underwent severe, chronic, interstitial, nephritic changes, so that in a few months, although the water constituents of the urine were secreted in large amount and gave the patient much discomfort, there was no urea or practically none. In consequence, after consultation, the left kidney was removed. For a time the patient did very well, then without warning there appeared anuria. All the ordinary methods of giving diuretics, putting warm poultices on the back, etc., were tried and did not relieve this condition, the patient developing anasarca and slight uremic symptoms. With the intention of irrigating the pelvis of the kidney with hot salt solution to stimulate the kidney, I catheterized the ureter and at once clear urine began to be secreted in an almost continuous stream. In the first minute there was secreted 10 c.c.; in the second, 10 c.c.; in the third, 10 c.c.; and for four hours the kidney continued secreting on an average of 8 c.c. per miunte, and in twenty-four hours secreted 6 liters of urine containing 80 grams of urea.

It is, of course, very exceptional for two kidneys under any conditions to secrete within twenty-four hours the amount of urea and the amount of fluid that this single kidney secreted. The circumstances were unusual as there was a huge heaping up of waste products and fluid in the tissues by the suppression of urine for more than twenty-four hours due to the obstruction of the ureter by nodular cancer. In this case, as soon as the ureteral catheter came out, the patient immediately ceased excreting urea.

The second step is to inject through the catheter a saline solution colored with methylene blue until a definite pain is produced in the kidney. I employ for this injection a syringe holding 15 c.c. and with a nozzle especially adapted to be introduced into the renal catheter.

While the injection is being carried out a small, glass cath-

eter should be in the bladder, and the slightest appearance of colored solution through this signifies a reflux around the ureteral catheter, and demands the employment of a larger size. The total amount injected is noted and recorded.

The third step consists in the re-collection of the aniline solution, which is allowed to flow back through the catheter. This should be done until the solution has lost its blue color and assumed a light, greenish tinge. The character of this flow and the amount admitted should also be most carefully observed. The figures obtained by these measurements give a fairly accurate estimate of the size of the renal pelvis and its associated calices. Out of 40 *cases with presumably normal* kidneys, since injection gave a pain entirely different from anything the patient has ever had before, the *average capacity was found to be* 8 c.c., the smallest capacity 2 c.c., and the largest 20 c.c. This average capacity of 8 c.c. corresponds very closely with the measurements obtained by Mr. Brödel on autopsy kidneys. On a large series of cases he found that 7 c.c. represented the average capacity of a normal pelvis. The frequency of dilatation of the pelvis in stone and tuberculous cases and also in movable kidney is illustrated by the fact that in 65 cases the average capacity was found to be 12.7 c.c. This group of cases does not include any in which genuine hydronephrosis was suspected.

Mrs. S., Johns Hopkins Hospital, Ward H., January 8, 1907.

Diagnosis. Stricture of right ureter at level of pelvic brim.

Operation. Exploration of ureter with release of constricting band and dilatation of ureter, extraperitoneal.

Findings at Operation. A large dilated hydro-ureter above, with a constriction at the level of the pelvic brim, the ureter below the constriction being in every way normal. Before operation and during an acute attack of renal colic, the right ureter was catheterized and 60 c.c. of urine obtained

immediately. 60 c.c. were then injected into the right ureter before pain was brought on.

Cystoscopic Examination. January 8, 1907. The bladder looks normal. The right ureteral orifice is normal; the left orifice normal. A No. 10 cystoscope used. Patient in the knee-breast posture. A large renal catheter with wax tip was passed easily up the right ureter, the catheter being passed into the ureter for a distance of 22 cm. A smaller catheter was passed into the left kidney. There immediately flowed from the right side 12 c.c. of clear urine; also from the left side 12 c.c., the patient being in the upright position on her knees. (The patient had been drinking water freely previous to examination.) She was then placed on the left side. The rate of flow from the right side was intermittent—4 c.c. to the minute. The right side was then injected with methylene-blue solution; 25 c.c. of the solution brought on pain, whereas before the operation 60 c.c. were required to bring on pain. As soon as the pain started, patient was raised in the upright position and the urine from the pelvis collected. There was an immediate flow of about 18 c.c. On withdrawing the catheter 5 cm., 2 c.c. were obtained; on withdrawing 4 cm. more, 2 c.c.; on withdrawing 4 cm. again, no immediate flow, but normal, intermittent flow obtained. The catheter at this point was only 9 cm. in the ureter.

There was some reflux on injection, possibly of 20 c.c., and this probably, with a part of the urine which would naturally have remained in the enlarged ureter, escaped around the catheter into the bladder as the catheter was withdrawn by degrees. Therefore, a better demonstration of the actual presence of a hydro-ureter was not possible.

The right ureter was catheterized and a scratch mark was obtained. The resident, Dr. Hutchins, explored the ureter but could find nothing but a stricture at the pelvic brim. An *x*-ray picture was taken and a report of "no stone" was made.

I catheterized the kidney and got a definite wax-tip scratch;

on this finding the ureter and the kidney were explored and a large ureteral stone found with the hydronephrotic kidney. The *x*-rayist on revising his findings determined that he had the sides of the plate mixed and that a stone was actually present. Although this was the fault of the operator and not the *x*-ray method, it should be recorded as a failure of the *x*-ray.

Case Illustrating that by Injecting the Kidney, the Location of Pain May Depend upon the Location of the Kidney. This Case of Pelvic Kidney Injected, Caused Pain in the Pelvis.

Ida T., aged thirty-three years, colored woman; Cambridge Hospital, March 28, 1907 (Case of Dr. C. F. Burnam.)

Diagnosis. Pelvic kidney (left), and adherent ovarian cyst (left). The family and past history were negative. Her present illness had lasted eighteen months. She first noticed a small tumor in left side the size of an orange which had been growing continually and occasioned much pain. No trouble with micturition. Menstruation regular and not excessive. "Never pregnant." Bowels constipated.

Physiological Examination. Normal temperature, pulse, and leukocytosis and urine; abdomen occupied by a large, cystic tumor; uterus outlined anteriorly.

Operation. March 1, 1907. A median abdominal incision. Large cyst springing from the left ovary, and filling the entire pelvis and lower abdominal cavity, made out, densely adherent to the rectum, omentum, some loops of small intestine, and the uterus. This was partly evacuated and then cut free with scissors from its attachments. After removing the cyst, examination showed a small body in the pelvis lying behind the peritoneum and in the hollow of the sacrum; this was a normal-shaped kidney with its pelvis facing outward in place

of inward with blood supply seeming to come from the aorta. The abdomen, after controlling all hemorrhage and covering the raw areas with peritoneum, was closed in layers with catgut.

Examined per rectum after operation, the kidney was felt in position described. While the abdomen was open, the right kidney was palpated and found to be a little lower than normal, being situated behind the upper part of the cecum; it was moderately movable. Patient convalesced without any untoward symptoms.

On March 28, cystoscopic examination in knee-breast posture: Bladder vertex, diameter 5 cm.; bladder fundus, diameter 5.5 cm.; from interior urethral orifice to left ureteral orifice, 1.5 cm.; right, 1.5 cm; urethral length, 4 cm.; length left ureter, 12 cm. and renal pelvis; length, right ureter, 25.5 cm. and renal pelvis.

Both kidneys secreting clear, normal urine in the normal spurting ejaculatory way.

Into the left kidney 8 c.c. of a sterile suspension of bismuth subnitrate in salt solution were injected. *This brought on a typical attack of colic, except that the pain was not referred to the loin but to the pelvis where the kidney lay. On letting the fluid run out the pain quickly disappeared.*

An *x*-ray immediately taken shows kidney pelvis and ureter.

The interest in these cystoscopic findings lies in the fact that it offers an absolute method of diagnosticating a pelvic misplaced kidney.

Problem: An unknown mass to right of rectum not sensitive is felt in the pelvis.

Solution 1. The ureter is found to be very short on the side of the mass.

Solution 2. Injecting the ureter causes colicky pain in mass.

Solution 3. Injection of bismuth and an *x*-ray picture complete diagnosis.

As the kidney had never occasioned any distress and was functioning normally, there was no occasion for further interference.

First Case of Hydronephrosis Calibrated.

Mrs. J. M. De L., aged forty-three years, January 25, 1895.

Complaint. Growth in right side of stomach.

Menstrual History. Regular, lasts four days, moderate.

Marital History. Six children, twenty-two to eleven years; first instrumental, no miscarriages.

General Appearance. Pale, sallow, slight.

Present Illness. Since birth of last child, pain in limbs. Bowels constipated, no urinary difficulty. The patient for six years has had spells of severe pain in right side which is usually accompanied with marked disturbance of micturition. The pain may last a day or two, and is usually accompanied with nausea, vomiting, and fever.

Physical Examination. A mass was present in the right side 13 x 10 cm., comes within 3 cm. of the umbilicus in front. It disappears in the renal region behind the ribs. It shows tympany over its entire anterior surface. The liver dulness is normal.

Special Examination. On January 25 the right ureter was catheterized and it secreted in twenty-six minutes 125 c.c. This urine was faintly acid, had a specific gravity of 1007, contained a trace of albumin; it contained no pus or blood. The left ureter secreted transvesically 23 c.c. in fifty-five minutes. This urine had a specific gravity of 1019 and a faint trace of albumin. There were no pus or blood cells. The percentage of urea in the left kidney was 0.255, and in the right kidney 0.039. The flow from the hydronephrotic kidney was continuous and sluggish; during the first six minutes 40 c.c. were secreted, and in twenty-one and one-half

minutes 140 c.c., and in twenty-six minutes 155 c.c. After the withdrawal of this fluid, the tumor mass in the right side was about half the size it was before; became distinctly fluctuant and lost all feeling. This loss of tension in a large hydronephrotic kidney has been well illustrated in some of my other cases, and can be recorded accurately by the piezometer.

Very Large Hydronephrosis.

Mrs. M. D., aged forty-eight years, white. Gyn. No. 12742. Admitted March 2, 1906; operation March 5; discharged April 2. Diagnosis: Hydronephrosis, right. Operation: Nephrectomy, right.

Complaint. Pain and swelling in right side.

Family and past history negative. Menopause occurred two years ago. No disturbance with it. Has had three children. No trouble with the bladder or frequency of micturition.

Present Illness. Began fifteen years before coming to the clinic, with slight pain in right side. Pain at first came on about once a month and lasted an hour or two at a time. Five years ago a tumor mass was noticed in the right side. This was present for ten months, and she then had a severe pain for ten days and the tumor mass disappeared; from this time until October, 1905, there was no pain. She then noticed the mass in the side again and some pain. Ten days ago it began growing rapidly and causing a great deal of pain.

The general examination shows a weak-looking woman; normal heart and lungs. The abdomen was distended by a large, cystic-feeling tumor, filling the entire right side of the abdomen. This mass is 21 cm. long and 14 cm. across.

The right ureter was catheterized with a wax-tip catheter, which showed no scratch marks after its removal. The catheter was introduced 11 cm. into the ureter; at the same

time the catheter was introduced into the left ureter for 18 cm. Both ureteral orifices and the bladder looked perfectly normal. There began an immediate flow of urine from the left side in the characteristic spurting manner of the normal functioning kidney. *In the first minute* 4 *c.c. were secreted, in the second minute* 2.5 *c.c., in the third minute* 7 *c.c., in the fifth minute,* 8 *c.c. During the same time there was no flow whatever from the right side.* 210 *c.c. of aniline solution were injected into the right ureter, causing the tumor to become tense, hard, and painful. There was no flow back, however.* A diagnosis of a hydronephrotic kidney with the valvular closure of the upper end of the ureter was made.

Operation. An oblique incision was made through the linea semilunares down to the peritoneum. An attempt was made to strip the peritoneum back from the tumor mass, but as this proved difficult the peritoneum was entered and the kidney enucleated without great difficulty. A gas anesthesia was employed throughout. Patient did very well after this operation and went out of the hospital well. It should have been stated that the examination of the urine showed that it was normal. An examination of the specimen after its removal showed an enormous hydronephrotic sac which contained 1250 c.c. of fluid. The ureter, which ran over its anterior face, was gradually closed off by the pressure of the tumor.

Large Hydronephrosis Treated by Plastic Operation on Ureteral Orifice.

Mrs. A. K. (San. No. 1194), aged fifty-six years, the mother of four children, came to me June 15, 1901, from Dr. Fletcher Lutz. With the exception of typhoid fever and some "kidney trouble" with her second child, she had always been a hearty, hard-working woman until the past six years, when her present invalidism began. She began first with a feeling of weight

and discomfort in her right side, accompanied by a constant feeling of fulness with flatulence and marked constipation. These discomforts were associated with occasional attacks of acute pain in the side, accompanied by nausea and vomiting and palpitation. Five weeks before I saw her a lump was noticed in the right side below the rib for the first time.

She had been rapidly losing weight and strength and had a cachectic appearance. The hemoglobin was 58 per cent., the appetite was very poor, and there was some nausea and often vomiting.

Under the impression that the fluctuating cyst was the gall-bladder an interior incision was made along the outer border of the right rectus muscle, when the tumor was found to be a large hydronephrotic kidney extending up under the gall-bladder. The duodenum was closely attached to its inner border. A band stretching across the sac proved to be a large artery which showed no signs of pulsation until the cyst was evacuated. Just below this band and in front of the sac the ureter was found. On squeezing the mass, the ureter filled with fluid and stood out prominently. In this way the whole sac was emptied.

Operation. The peritoneum was opened on the posterior surface and the duodenum dissected off from the sac and pushed inward and downward. The ureter was next dissected loose from the sac and raised up and an incision made at the angle of the junction of the ureter with the renal pelvis, extending for 1 cm. in either structure. The ends of the incision were then united with fine-silk suture, left long, but not tied. This served to regulate the application of the remaining silk mattress sutures, which were introduced 2 mm. apart and tied so as to unite the ureter to the pelvis of the kidney, in such a manner as to keep patulous the incision, doing away with the valve-like opening causing the retention of the renal secretions. Upon squeezing the pelvis of the kidney after tying all the sutures, it was seen that the fluid readily escaped

from the kidney down the ureter. The kidney was so large and flaccid, being about 18 x 12.5 cm., that it was thought best not to attempt to suture and suspend it, but to rely upon the free opening into the ureter to prevent future accumulations. The patient made a good recovery and has since remained in excellent health.

Illustration of the Difference in Flow from Renal Catheter from a Hydronephrotic and from a Normal Kidney.

Mrs. S. J. F., aged forty-seven years; No. 2079. February 6, 1906.

Diagnosis. Infected hydronephrosis, right.

Treatment. Irrigation of the pelvis of the kidney with 1 to 1000 silver nitrate solution.

Family history unimportant, as is also the past history. Menstruation is irregular, but is of normal amount and painless.

Present Illness. Has been an aching in the right side; this varies in intensity, occasionally being quite severe. *Six weeks before admission, for the first time, a violent attack of vesical pain* with frequency of micturition set in and lasted several days. Every month or two there *are severe headaches.* The patient has noted *that following the headache there is a large output of urine.*

Physical Examination. A general physical examination shows nothing; the temperature is normal, as also the pulse. *Neither kidney is tender nor palpable.* The pelvic organs are normal except for a relaxed vaginal outlet and a retroflexion of the uterus.

The bladder examination shows a normal bladder, except that both ureteral orifices are surrounded by red, inflamed areolæ.

The ureters catheterized, first the right; there was an immediate steady flow of 15.5 *c.c. in the first minute; in the second*

minute there were 7 *c.c.; in the third minute* 7 *c.c.; in the fourth minute* 8 *c.c.; in the fifth minute* 9 *c.c.; in the sixth minute* 2 *c.c. The flow was almost constant, drop, drop, drop, until* 40 *c.c. were reached; then the intermittent ejections began.* 30 c.c. of boric acid solution were injected into the pelvis of this kidney without pain. The wax tip on the end of the catheter was not scratched.

The left kidney then catheterized. In the first minute 6 *c.c. obtained; in the second minute* 5 *c.c.; in the third minute* 3 *c.c.; and in the fourth minute* 4 *c.c.*

The urine from the right kidney was colorless, clear, acid, contained no albumin or sugar. A few red blood cells, a very few pus cells, renal epithelium, and the colon bacillus.

The left kidney was secreting a clear urine; acid, without albumin or sugar; without pus cells or bacteria. Water had been given to the patient before the examination and a polyuria produced. The right kidney secreted 59 c.c. of urine of 0.15 per cent. urea in eight minutes, while the left in the same eight minutes secreted 115 c.c. of 0.05 urea. The right kidney was irrigated a number of times, and on April 26 the patient had normal urine. The right kidney's pelvis held 55 per cent. before pain was produced.

The Discovery of an Unsuspected Hydronephrosis of the Left Kidney.

Mrs. M. J. C., aged thirty-one years; admission No. 2034. December 8, 1905.

Diagnosis. Hydronephrosis, double, with movable kidneys.

Operation. Plication of the pelvis.

Family history negative except that there were two sisters who died of tuberculosis.

Past History. Well up to the present illness, which began with the pregnancy one and one-half years before coming to me. In the fifth month of this pregnancy she was seized with

severe pain in the right renal region and after the onset of the pain the discharge of a large amount of pus in the urine was noted. From that time on until the very long and difficult labor, the patient had almost weekly attacks of pain in the kidney. After the labor these attacks have been coming on about once a month. During an attack the patient notes the formation of a tumor in the right side of her abdomen, which disappears with the discharge of pus by the bladder. Several consultants had diagnosticated a pyelitis of the right kidney, and her physician, Dr. Guthrie, had determined the presence of a right pelvic peritonitis with adhesions.

General Physical Examination. This patient is thin, having lost in weight from 145 to 109 pounds; is slightly anemic; hemoglobin 70 per cent.; the heart and lungs are normal, however, and neither kidney is palpable.

Bladder Examinations. The bladder and urethral orifices are normal. The right kidney was catheterized and 80 *c.c. of aniline solution injected without causing pain. The* 60 *c.c. of this flowed back immediately and continuously. The left kidney was then catheterized and* 35 *c.c. injected, causing pain. Neither kidney gave evidence of stone by the wax tip. Both the right and the left kidneys were markedly movable. The uterus is retroflexed.*

The urine from the left kidney is normal, there being no pus cells and no bacteria. That from the right kidney contains the colon bacillus and a few pus cells and a few red blood cells. The tubercle bacilli were searched for carefully and not found.

The temperature and pulse in this case were normal and there was no increased leukocytosis.

The following operations were done: Repair of a relaxed vaginal outlet; removal of the vermiform appendix; removal of an adherent right tube and ovary; suspension of the uterus by means of its round ligaments; plication of the pelves and suspension of both kidneys; the kidneys were approached by

the usual incision which I employ for exposing the kidney. I begin in the angle between the twelfth rib and the thick muscles of the back and extend forward and downward, striking what I have named the superior triangle. After opening Gerrota's capsule, the kidney was brought into view. The large, flaccid pelvis with its thickened wall was then plicated by passing three silk sutures so as to gather up the entire pelvis in a V-shape, one inside the other and only on the posterior surface. Each suture started by transfixing the margin of the kidney surrounding the pelvis, and was then carried down into the pelvis toward the ureteral orifice, picking up the tissues of the pelvis, without penetrating the mucosa and catching the strong peripelvic fascia, as in the last case, on the extreme edge of the pelvis. The suture then returned and emerged on the margin of the kidney. After passing three sutures in this way, they were drawn up so as to pucker and draw the pelvis together, when they were tied each to its own end, respectively. The kidney was then suspended to the posterior abdominal wall by three silk sutures in the manner which I am accustomed to employ.

This patient has done splendidly since her operation and reports herself in excellent health.

Case of Mild Hydronephrosis due to Movable Kidney Cured by Suspension.

Mrs. K. H., aged thirty-nine years. Gyn. No. 10697; September 3, 1903.

Complaint. Dull, aching pain in the left side.

Family History. Negative.

Past History. Was well until birth of child, then began having pain in the side. The patient had been married a number of years and had had six children. Her labors were all normal and there were no puerperal complications. There had never been any bladder troubles at any time.

Present Illness. The patient states that for several years there has been a dull aching in the right side. This is never entirely absent, but is more severe during menstruation and when she is on her feet.

General Physical Examination. The patient is fairly well nourished. No evidence of disease in the chest. The abdominal examination is negative except that the left kidney is felt movable to the third degree. The pelvic organs normal to touch. There is no thickening of either ureter. In order to make sure that the pain was due to the movable kidney, cystoscopic examination carried out. The bladder was found to be normal. Both ureteral orifices were normal and normally situated. The urine obtained from the bladder perfectly normal. *The left kidney was catheterized and* 50 *c.c. of aniline-colored solution injected. This brought on a definite pain which patient identified as that which she had been having. Upon this finding a diagnosis of movable kidney with mild hydronephrosis was made.*

Operation. Suspension of the kidney in the usual way.

Result. This patient writes in April, 1907, three and one-half years after operation, that she is and has been perfectly well. She promises to present herself to have pelvis of kidney measurements.

Movable Kidney with a Mild Grade of Hydronephrosis, Causing Attacks of Jaundice, Relieved by Suspension of the Kidney.

Miss B. E., aged forty-eight years. San No. 2200; May 29, 1906.

Family History. Negative.

Past History. Patient has always been well until the present trouble.

Present Illness. In June, 1905, the patient had a most severe attack of pain in the right epigastrium, associated with

nausea and vomiting, and severe jaundice. The pain radiates to the shoulder. These attacks, which last from a few hours to a day or two, have recurred frequently since then. Fever and sweats accompany attacks. A constant ache is also present in the side between attacks.

General Physical Examination. Very sallow. Temperature and pulse are normal. There are no abnormal elements in urine.

Special Examination. Urethra and bladder normal.

Measurements. To posterior wall of bladder 6.5 cm.; external urethra to right ureteral, 8 cm.; catheter enters ureter 25 cm.; *pelvic capacity 20 cm., and this causes pain of a different nature from that complained of*—which note.

Operation. Gall-bladder normal. Slight stricture of pylorus of stomach and, therefore, a pyloroplasty; appendectomy; suspension of right kidney. The kidney pressed on common bile duct. This patient has had complete relief.

I wish to thank my associate, Dr. C. F. Burnam, for his kind help in studying many of these cases and in preparing this manuscript.

DISCUSSION ON THE PAPERS OF DRS. COLE, YOUNG, CHETWOOD, WATSON, KELLY, BREWER, AND EDEBOHLS.

Dr. William E. Moseley.—In connection with this subject of kidney work, I want to show a specimen which I removed, in the Maryland General Hospital, in March last. It is of special interest, I think, to both societies, inasmuch as from the symptoms and the physical condition of the patient you might mistake it for an ovarian cyst. I operated on the patient for a case of supposed multilocular cyst of the right ovary. I only learned my mistake when I found the pedicle was high up,

and proved the tumor to be a very large surgical kidney with a calculus in the pelvis shutting off the ureter.

The woman, a widow, having had eight children, was fifty-six years of age, the menopause having occurred four years previously. She had never had any symptoms of kidney trouble, with the exception that she gave a vague history of having had renal colic some years before. Following the time of the menopause, at the age of fifty two years, she first noticed some discomfort and tumefaction in the right iliac fossa which gradually extended over to the left side of the abdomen. This seemed to have no special influence on her health except that she lost flesh rapidly, and when she came under my observation, the 14th day of last March, she was to me a typical specimen of a women with an ovarian cystoma. The tumor extended diagonally across the abdomen and pelvis from the lower left iliac fossa well up under the ribs on the right side. It was oval in shape; it had areas of distinct fluctuation, with immediate thickened portions, simulating a condition which we so often find in multilocular ovarian cysts. An examination of a twenty-four-hour specimen of urine showed nothing except a small amount of pus, which might have come from the vagina, and a trace of albumin, with some hyaline casts, a condition which one would expect to find as the result of pressure. About a week subsequent to that there was rather scant urinary secretion, about 360 c.c. in twenty-four hours, but under diuretics and general tonic treatment the urine doubled in quantity, and the albumin and casts disappeared.

There was also very much less pus in the urine.

I operated, on March 28, for ovarian cyst, and found everything apparently densely adherent, and with difficulty removed this growth, finding, as I have previously said, that I had made a mistake when I discovered that the pedicle was high up in the kidney region. It was dissected out, and the patient has done well since. I only give this description of it as an introduction to the specimen which I will now pass around, and which I think will be of interest to you. The pathologist's report will appear in the TRANSACTIONS.

I want to add that in order to remove this kidney it was found

Kidney above; calculus below.

necessary to evacuate it, and seven and one-half liters of creamy pus was removed.

The patient made an uneventful recovery.

Pathological Report Furnished by Sidney M. Cone, M.D.

Specimen consists of an enormously enlarged right kidney, containing a large renal calculus and a large quantity of pus.

1. Kidney measures 25 x 17 x 6 cm. and weighs 1620 gm. Surface smooth, covered by fascia with some fat, presenting shallow depressions, giving it a more or less lobulated appearance. On the ventral surface is an opening 2 cm. long from which pus had been evacuated at operation. The vessels and ureter are cut off 1 cm. from hilus of kidney, and are pervious at this point. On enlarging the original opening, six communicating cavities are seen the walls of which vary in thickness from 0.04 to 2 cm. Cavities are lined by soft, blood-stained tissues; yellow, adherent, necrotic material, and fibrin which can be scraped away quite easily. A section through the thickest of the septa between the cavities shows a homogeneous, gray lining wall 3 mm. in thickness, outside of which is a grayish-white tissue, including yellow streaks and splotches, resembling caseous material. This material occupies the space that should contain pink or gray cortical substance. No trace of cortical striation or coloring is evident at any point.

Microscopic Description.—A section taken through one of the septa between the adjoining cavities shows a dense mass of sclerotic connective tissue covered by fibrin, polymorphonuclear leukocytes, and red blood cells on two sides, the third side, corresponding to the surface of the kidney, showing chiefly adipose tissue infiltrated by round cells. Several circumscribed areas of large connective-tissue cells show hydropic degeneration.

Throughout the specimen are seen capillary vessels, small round cells, polymorphonuclear leukocytes, and degenerated cells. No normal kidney structure is to be seen, the nearest approach to this being in a circumscribed area of granulation tissue, where there are seen, faintly outlined, wide tubules of granular debris, with faint, non-staining nuclei.

Sections through other parts of the specimen show more or less similar processes, though differing in degree.

Diagnosis.—Suppurative nephritis (surgical kidney).

2. The stone is a brownish, irregular, crushed mass 5 x 3 cm., having a base 1 cm. in diameter, from which four legs, two side by side and 1 cm. in length, the other two 1.5 cm. in length, extending irregularly from one extremity of the stone. Weight of stone, 31.275 gm.

3. The pus obtained from kidney measures 7500 c.c., is thick and creamy, containing flaky particles. Under the microscope are seen many broken-down polymorphonuclear leukocytes, the nuclei showing all stages of nuclear degeneration. Nowhere are entire cell bodies seen. A few faintly stained bacilli and cocci are seen. Culture on agar shows no growth.

Dr. Eugene W. Caldwell.—Mr. President: I wish to show[1] some plates to differentiate between calcareous bodies. Here is a case in which was found a calculus opposite the transverse process. The picture is double, and this is part of a scheme for detecting whether a stone is in the tract or not. Two plates are made at different angles, which form a stereoscopic picture. With this plate, this shadow seems to show a calculus in the ureter. Fortunately, we wanted to get a more accurate determination, and this time we found the same shadow moved to the opposite side of the body, and it is shown here opposite the lower pole of the kidney, and there (indicating) in the other one. The stereoscope in this case showed the body to lie in front of the kidney, so that it could not be in the urinary tract, and it was a calcified gland in the mesentery. This is quite in line with many of the cases Dr. Cole showed in which other foreign bodies and urinary calculi caused confusion in the diagnosis.

Here is a case in which there are two calculi in the ureter.

Another case shows urinary calculi in the neighborhood of the spine and ischium. These calculi are known by various names, and among them we may mention phleboliths. Their shape is typical. Their position with reference to the spine and ischium is typical. This plate shows a thickened ureter. A normal

[1] These comments were made in describing a series of lantern slides which were thrown on a screen.

ureter does not show in this plate. As illustrating another of the bodies mentioned by Dr. Cole, I show you a calcified artery, whose lumen is shown because the rays passed through its diameter. The lateral walls are also shown.

As illustrating still another point brought up by Dr. Cole, and showing the difficulty of getting rid of fecal matter, I will say that this is the case of a young man who had a thorough course of catharsis, which was followed by ordinary enema. The bowel and rectum were greatly distended because of large fecal masses, and the patient had symptoms which pointed to calculus, but which disappeared after completion of the catharsis.

Another case of Dr. Brown shows three ureteral calculi, and one of these small round bodies over the ramus of the pubes. A small calculus lodged behind or in the ureter is shown through the ileum, and an anomalous process from the last lumbar vertebra which articulated with the ilium. This is shown simply to illustrate how puzzling the diagnosis of these cases may be sometimes.

I show you another case in which there are shadows; they are not calculi, and I do not know what they are.

I am in accord with most of the conclusions drawn by Dr. Cole. There are one or two, however, that I wish to dissent from, particularly the one in which he said it is possible to show a calculus with the *x*-rays. There are combinations with pure uric acid calculi in which it is impossible to make a diagnosis. I believe, from considerable experience, that there is no other method so accurate as this one.

One other point with reference to the matter of using certain expressions with regard to the rays. The terminology of Röntgen-ray work is pitiably meagre, and, therefore, I think we can justly criticise some of the terms that are in ordinary use. To the term secondary ray there can be no objection, because we find it was suggested by Röntgen in 1897, and has come into general use. Such terms as direct and indirect rays are open to objection: First, because they are not sufficiently descriptive; second, because they imply and disregard phenomena which have been well known. Many appliances have been devised for cutting off so-called indirect rays long before the tentative ray of selective

absorption was proposed, and these devices were on the market. Therefore, I think it is unfortunate to use such expressions at this time, although I must confess the need of suitable expressions for our use in this work.

Dr. Howard A. Kelly.—I wish to ask Dr. Cole if there is any secret about any part of this *x*-ray matter from beginning to end? According to a friend of mine, who is quite an *x*-ray expert, there is an impression prevalent that some parts of the process are kept secret, and there are *x*-ray experts who will not tell the rest of the profession what they know. I would like to know whether there is any secret about it from beginning to end.

Dr. Cole, replying to Dr. Kelly's question, said there was absolutely no secret about the making of these skiagraphs. Dr. Kelly, who is world-renowned for his attention to minutest details, and who has just read such a valuable paper on mensuration of the bladder, should know that the secret of success in skiagraphy, as in any other branch of medicine or surgery, lies in the attention given to the minutest details from the catharsis of the patient to the reading of the finished negative.

Dr. Henry W. Bangs.—May I contribute a word or two from the standpoint of the clinician? It goes without saying that this has been to me an exceedingly interesting discussion. These admirable papers to which we have listened speak for themselves. I would like to comment upon one or two points. One of them is a small point, and yet from the standpoint of the clinician it has some significance because of the pain which I am certain that it causes a patient who is subjected to it, namely, the presence of these so-called phleboliths. I confess, when I have felt them, even irrespective of any relation to kidney symptoms, and, therefore, without any relation to any radiograph, I have been puzzled as to their exact situation, their composition, and as to what I shall do for them. I would like to know what they are and what to do for them.

As to ureteral stones, all those who are engaged in genito-urinary work know that they are comparatively common. The diagnosis has been made easier for us since the introduction of the radiograph, and, therefore, surgical procedures can be insti-

tuted more promptly to afford relief. But there are some stones which apparently require a surgical procedure for their removal, and relief may be afforded to the patient by a comparatively simple measure. I recall a case in which I had to deal with a stone that was triangular in shape, rough in surface, and nearly half an inch long. I thought, and had come to the conclusion, I would have to open the abdomen of the patient and remove the stone by the proper surgical procedure; but by means of an instrument in the bladder and manipulation of the rectum I dislodged the stone, which had been in its place for a year, according to the symptoms given by the patient. The stone extruded itself into the bladder, and by further experimental procedure I caused its dislodgement. I was encouraged to undertake the procedure I have mentioned by a previous experience I had had, where, by means of several radiographs, we were able to trace the stone from the kidney down to the ureteral orifice into the bladder, and finally secure its dislodgement. Therefore, I was more competent to undertake the dislodgement of the stone in the second than in the first case, although in both cases I was successful.

I want to call attention to a thought suggested to me by Dr. Brewer's paper. We are indebted to him for calling our attention to a serious acute condition, mostly in women in his cases. I would like to have our gynecological friends, if they can, explain that. I have noticed it before; but I have had a case in a man who had a number of symptoms which were distressing. He suddenly had an attack of la grippe, but there was an irregular rise of temperature, at its onset, of about 104°, and when I was summoned in consultation in the case I was convinced he had a pus kidney; although I am not prepared to say it was an acute nephritic condition which Dr. Brewer has described. His complaint was practically confined to the left side, where there was rigidity of the muscles and also tenderness on deep palpation. Cystoscopy revealed purulent fluid escaping from the left ureter. I proposed, at least, an exploratory operation upon that kidney, which was refused. His temperature went on irregularly; he complained of pain on the right side; there was a rise of temperature (I have forgotten its height), but it was not high as compared with the preceding temperature,

and within twenty-four hours after a sudden rise of temperature he complained of colic on the right side, and there was a sudden escape of two drams of clear pus by way of the urethra. Here was a complexus of symptoms which caused us hesitation in diagnosis. The patient subsequently refused operation, went on, and gradually got well.

Dr. F. T. Brown.—I would like to speak with reference to a few of the facts brought out. I am sorry there is not more time to refer to points in Dr. Huntington's paper. I would say in that connection that his description of the anatomical reasons for so-called phantom (?) kidney leads us to say how ineffectual the cystoscope would be in such cases if there were no pathological conditions connected with these kidneys; that by cystoscopy, seeing the ureteral mouths in normal position, and passing the ureteral catheters into the ureters and getting normal urine, we would have no idea of the fact that the kidneys were atypical in their relations to each other; whereas by the employment of the added device, to which reference has been made by several speakers, that is, the stylet in the ureteral catheter, we would have at once the evidence of the anatomical conditions existing, and with that and by that means only will we have a clear idea in case there was any pathological condition of one of these kidneys, or one part of this merged kidney; and it would be of great value to know this. We might learn that by ureteral catheterization, passing the ureteral catheter into each normally placed ureter, and attempting to draw our deductions from the results, getting on one side an infected pyuria, and on the other side normal urine, we might reasonably ascribe the position of that kidney to the abnormal one. For instance, let us say that pus came from the normally placed right ureter, we might ascribe it to an abnormal condition of the left ureter. These two kidneys might be merged together on the right side, and if we do not employ the stylet catheter in these cases, we may be led astray, so that I will make a plea for the more extensive employment by genito-urinary surgeons of both these resources, and it is well to make use of them at one and the same time, having a table so constructed that it is suitable for ureteral catheterization, for cystoscopy, and if there is any reason to make it desirable

to learn further about the case, without the patient having been disturbed, an *x*-ray examination should be made, keeping the ureteral catheters in place, and simply putting a stylet up each ureter to determine the position of the ureter in the kidney.

I can show one case of double ureter where this condition was verified, and where we could only learn the lengths of the ureters and their points of entrance into the kidneys by this test. There were pathological conditions in this case, and after many consultations and considerations I was in favor of deferring operation because I fully believed that partial operation for the removal of the lower portion of this kidney having a double ureter would not be very feasible, or it would be attended with so much trauma as to necessitate a complete nephrectomy, the woman's condition hardly justifying it. I show you on the screen the double ureters, with stylet in each catheter, and here you will observe that one shadow is heavier than the other. A heavier stylet was put into one ureter than in the other.

Here is a case where it was almost impossible to determine the nature of a large, low-lying tumor in the pelvis, and while the ureteral catheters were apparently passed the same length, yet with one catheter we were able to withdraw urine, while with the other no urine came.

With reference to the diagnosis of stone by means of the *x*-rays, I would like to say, despite the wonderful advances of *x*-ray work, and the excellent work done by the leading exponents of the *x*-rays, which we have in New York (and it is hardly necessary for me to mention Drs. Cole and Caldwell, whose work is on a par with any that is done in this country or in the world), I cannot agree with the first speaker in his maintenance of the fact that a negative diagnosis can be made by *x*-ray work alone, no matte how expertly it is carried out. He has done a great deal of work for me, and I have the highest regard for him, but I cannot agree with him that stones of all kinds can be determined, even by the excellence of his work and technique.

Dr. Edwin B. Cragin.—May I say a word or two in explanation possibly of the question asked by Dr. Bangs as to the greater frequency of kidney infection in women than in men? We find in pregnancy that the ureter, especially on the right side, is often

dilated, this explaining the frequency of the pyelitis of pregnancy, and also being one of the causes of kidney infections being more frequent in women than in men. The position of the uterus in the right oblique diameter of the pelvis, especially as it enlarges, obstructs to a certain extent the flow of urine from the right kidney, making the right kidney more vulnerable, and, therefore, its infection more frequent.

Dr. Francis R. Hagner.—I would like to report a case in connection with Dr. Chetwood's paper. It is a case of calculous pyonephrosis, showing the importance of considering nephritic calculus where only bladder symptoms are present. The patient was a male, aged thirty-nine years. When seventeen years of age he was refused life insurance on account of pyuria. He had had no illness except diphtheria, at the age of sixteen years. He had never had renal colic. He had had frequent urination since he was seventeen, and all the symptoms of bladder irritation. At times there was great pain in the bladder, and he was thought to have a cystitis. His bladder was washed out at different times, and his physician thought he had tuberculosis. Physical examination disclosed a tumor which could be made out in the right kidney region. On May 24, a year ago, with the cystoscope the mixed urine showed about one-quarter pus by volume; but there were no microörganisms present in the urine. Cystoscopic examination showed a normally appearing bladder, except an eversion of the right ureter. By catheterizing the left ureter, normal urine was obtained. It was impossible to catheterize the right ureter on account of this eversion; but, on inspection, worm-like masses were being passed from it at intervals. The *x*-rays were negative in this case. The *x*-ray which was obtained was not as clear as it might be, and there was a clouding in the region of the kidney. Three stones were shown in that kidney in all, but possibly there were thirty smaller ones in the dilated portion. An extraperitoneal lumbar operation was done on this patient, and recovery was uninterrupted. The patient passed fifty-six ounces of urine the second day after operation. He has not had any pain in the kidney since. I simply report this case as showing the importance of considering the kidney in cases of vesical irritation.

Dr. A. Lapthorn Smith.—I wish to report a case in connection with what has been said. A woman came to me with what was supposed to be a large ovarian cyst. It was fortunate that I was misled, because I opened through the abdomen and found a large pyonephrosis from which I removed about a gallon of purulent fluid, and then I found a number of large calculi which would have been too big to have removed through an incision in the loin. I removed all quite easily through the abdomen, and the woman made a good recovery. One remarkable symptom in this case was a fast pulse, which lasted a month afterward. It was 120 when she left the hospital. She had several children afterward, without any bad effect.

In reply to the question why women are more liable to these troubles than men, I think there are two reasons for it: One reason is their greater liability to tuberculosis; the other is their greater confinement to the house than men leads them to develop a uric acid diathesis and calculus troubles generally.

Dr. Cole, replying to Dr. Caldwell's statement regarding the nomenclature and the use of the terms "direct" and "indirect" rays, said he would simply say that he had worked along this line and came to these conclusions, and after coming to these conclusions he had called the rays by these names as best describing them. He knew of no such work having been done previously. Not reading German, he had asked men who should have known if work had been done along these lines. It appeared to be new, and he therefore published it as such. If the separation of the rays had been described before, its importance was not recognized, as Dr. Caldwell, in his book published about that time, mentions the second or sagnyac rays and also mentions a ray called by the French parasitic ray, but does not recognize either as particularly detrimental, and even now the difference between the secondary or sagnyac ray and the so-called indirect ray generated at the wall of the tube by the deflected cathode stream is not generally recognized. Whether the indirect ray is old or new, or whether it has been described before or not, is not as important as the fact that the majority of the physicians doing this work have not recognized it as the most important cause of failure in skiagraphy, and that the

elimination of it gives the results shown this morning by Dr. Caldwell and myself.

Dr. Chetwood.—It would be obviously impossible, after such a brief description of the cases, to draw any satisfactory conclusions or to summarize in a satisfactory manner. Had time permitted, I would like very much to have drawn attention to some of the omissions, defects, and errors in the working out of these cases, in order to emphasize the great importance of preliminary work and of having records of all measures undertaken, the preliminary diagnosis, the *x*-ray laboratory work, and the use of the cystoscope preparatory to proceeding to operation.

Finally, I would like to give due credit for the admirable and beautiful mounting of these specimens to Dr. Sondern, of New York, without which my contribution would have very little merit.

THE PROPHYLACTIC AND CURATIVE TREATMENT OF OPHTHALMIA NEONATORUM; WHAT SILVER SALT SHALL BE USED AND WHAT STRENGTH.

By Edwin B. Cragin, M.D.,
New York.

One of the burning questions of the day is how to reduce the number of those who go through life handicapped in the race, or, perhaps, a burden upon the State, on account of an impairment or loss of vision, the result of ophthalmia neonatorum. Naturally the solution of this problem concerns the treatment of the baby's eyes immediately following its birth, and as various methods of treatment have been used by the writer in his service at the Sloane Maternity Hospital, and as each method has been followed in a series of one or more thousand confinements, the comparison of the results of the different methods is of interest.

Before taking up the individual methods of treatment, the following general propositions should be noted:

1. A baby that is premature and of low vitality is more liable to ophthalmia than one which is mature and vigorous.

2. On account of the dangers of contagion, babies congregated in a hospital are more liable to ophthalmia than babies under the same treatment, and under the same obstetrician, in private practice.

3. The number of cases of ophthalmia in a hospital service will vary somewhat with the class of cases admitted,

but whatever the treatment employed, judging from the writer's experience, a certain number of cases of ophthalmia will inevitably occur.

In the five methods of prophylactic treatment, used by me at the Sloane Maternity, the smallest number of cases of ophthalmia in 1000 confinements has been 17, the largest 34. Hence, with the present known methods of prophylaxis, in a hospital service of 1500 confinements per year, in which emergency and ambulance cases are received, one must expect from 15 to 25 cases of ophthalmia in each 1000 confinements.

By ophthalmia here is meant a purulent conjunctivitis. The objects desired are: (1) To reduce the number of cases; (2) to have the disease as mild as possible when it does occur.

According to our present knowledge the best way to prevent ophthalmia neonatorum is, immediately after the birth, to cleanse the eye from the discharges of the birth canal with a bland solution, and in a manner least likely to irritate the eye, and then instil into the eye a disinfecting solution, which will give the greatest amount of disinfection with the least amount of irritation.

In cleansing the eye it is my custom to flush it from inner to outer canthus with boric-acid solution, by means of a medicine dropper; the outer surface of the lids being then bathed in the same direction with the same solution. The problem now before us is the choice of the solution which will give the greatest amount of disinfection, with the least amount of irritation of the eye. By common consent a solution of some salt of silver has been adopted as best serving this purpose. The problem of this paper then is the determination of the best salt of silver to use. During the last seven years the writer has used as a prophylactic measure in five different series of cases five different silver solutions: nitrate of silver, 2 per cent.; nitrate of silver, 1 per cent.; protargol, 5 per cent.; argyrol, 10 per cent.; argyrol, 20 per cent.

The results have been as follows:

Series I. In 1000 confinements, 2 per cent. nitrate of silver solution: Cases of ophthalmia, 18; eyes lost, none; opacities, none.

Series II. In 1000 confinements, 1 per cent. nitrate of silver solution: Cases of ophthalmia, 34; eyes lost, 1; opacities, none.

Series III. In 2000 confinements, 5 per cent. protargol solution: Cases of ophthalmia, 53; average per thousand, 26+; eyes lost, 1; opacities, 1.

Series IV. In 2000 confinements, 10 per cent. argyrol solution: Cases of ophthalmia, 34; average per thousand, 17; eyes lost, 1; opacities, 2.

Series V. In 2000 confinements, 20 per cent. argyrol solution: Cases of ophthalmia, 43; average per thousand, 21+; eyes lost, none; opacities, none.

During the use of the 2 per cent. nitrate of silver solution, the irritation of the eyes with the accompanying edema and discharge, the so-called "Silver Catarrh," was so great that, not only did it occupy a great deal of our nurses' time in applying compresses and irrigating the baby's eyes, but it seemed to me to be a source of danger, not only by leaving an irritated eye which might later become infected, but also by causing in our nurseries discharging eyes from which the discharge might be carried by nurses to healthy eyes, and thus infection produced. For this reason, although no eyes were lost in this series, and, *as far as known*, no opacities produced, the strength of the nitrate of silver solution was reduced from 2 per cent. to 1 per cent. I have said above "as far as known," for the reason that in this series of 1000 confinements five babies were taken from the hospital with ophthalmia unimproved and against advice, in whom the ultimate result is unknown to the writer. In this same series two babies died with ophthalmia uncured. In the second series, with the use of the 1 per cent. nitrate of silver solution,

the lessened irritation of the eye seemed a great improvement; but, as shown in the above table, there occurred 34 cases of ophthalmia, nearly twice as many as in the previous series, and, in addition, one eye was lost by perforation of the cornea. It looked as though the lessened irritation had been gained at the expense of protection, and for this reason the use of the 1 per cent. nitrate of silver solution was abandoned. At about this time the use of protargol came to the writer's notice, and in the next series of 2000 confinements a 5 per cent. protargol solution was used as a prophylactic measure. The lessened irritation was a great comfort but, alas, in this series, although there were fewer cases of ophthalmia than with the use of 1 per cent. nitrate of silver solution, one eye was lost and there was one opacity.

In the next series of 2000 confinements, 10 per cent. argyrol solution was used with the following results: The number of cases of ophthalmia per thousand was 17, the smallest number in any series of the 8000 cases; there was a complete absence of irritation, and the drug was a safe one for a nurse to apply at frequent intervals, in case ophthalmia developed.

Unfortunately in this series of 2000 confinements, one eye was lost, and two babies left the hospital with a small opacity of one cornea. For this reason it seemed to the writer that in spite of the reduction in the number of cases per thousand, the protection was insufficient, and, therefore, in the next series of 2000 confinements, which comprises the last 2000 confinements at the Sloane Maternity ending April 1, 1907, the strength of the argyrol solution as a prophylactic measure was increased to 20 per cent.

In this series no eyes were lost; there were no opacities of the cornea, and no babies left the hospital with a purulent discharge. For reasons which I will soon state, however, the number of cases of ophthalmia was larger than in the preceding series, that is, 21+ per thousand. This series covered a period in which there was an epidemic of so-called "pink

eye" in the city; and, as no gonococci were found in the eyes of our babies during the month, it was thought by the ophthalmologist, who saw some of my cases in consultation, that they were cases of pink eye. On comparison of the results in the five different series it is seen that Series V, treated with 20 per cent. argyrol, surpasses all the others save Series I, in which 2 per cent. nitrate of silver was used; and when it is noted that in this series five babies left the hospital with ophthalmia uncured, while in Series V no baby left the hospital with a purulent discharge from either eye, it seems to the writer that Series V should receive the preference.

In addition to this the freedom in Series V, from the silver catarrh, with its demand for cold compresses, frequent irrigations, and frequent attentions from the nurses, so pronounced in Series I, has proved a great boon to the hospital regime.

It must be admitted that the original cost of the argyrol solution is much greater than that of the nitrate of silver solution, but when one considers the greater staining and injury to towels, sheets, etc., and the greater demands upon the nurses in the use of the solutions of nitrate of silver, it has seemed to the writer that, viewed at the end of the year, the tax upon the treasury of the hospital from the use of argyrol was but little if any greater than from the use of nitrate of silver.

In confirmation of the proposition, stated in the earlier part of the paper, that the congregation of babies in a hospital somewhat increases the liability to ophthalmia, the writer would state that during the six years covered by the five series studied above, in an active private obstetrical practice, although using the same methods of prophylaxis which he employed in his hospital service, he has had no cases of ophthalmia.

Viewed from the clinical standpoint alone, the method employed in Series V seemed the most satisfactory, but that he might have a reason for the faith which lay within him,

the writer had made for him, by Dr. Charles E. North, of the Lederle Laboratories, New York, a series of very careful investigations concerning the bactericidal power of the silver salts used in the different series. The tests were made with the Staphylococcus pyogenes aureus, the Streptococcus pyogenes, and the gonococcus and were made in duplicate. The method of procedure was to transfer the cultures to the disinfectant solutions of different strengths for the various times, and then again from them to large tubes of broth holding 50 c.c. each. In this way any chance of the small amount of disinfectant, which might still cling to the organisms, having any restraining action on the growth, was eliminated by the large quantity of broth used.

In the case of the gonococcus two strains of the organism were secured, one of which was a very sturdy grower. Both of these were used as a check upon each other in the case of argyrol and similar results were obtained in both cases. The gonococcus was cultivated in ascitic broth.

The times of exposure were from thirty seconds to thirty minutes, in the cases of the Streptococcus pyogenes and the gonococcus; and from thirty seconds to twelve minutes, in the case of the Staphylococcus pyogenes aureus.

In the results which follow the minus signs indicate no growth. The plus signs indicate a growth:

NITRATE OF SILVER SOLUTIONS.

Streptococcus pyogenes.

Time.	2 per ct.	1 per ct.	½ per ct.	¼ per ct.	1/10 per ct.	1/20 per ct.
30 seconds	— —	— —	+ +	+ +	+ +	+ +
1 minute	— —	— —	+ +	+ +	+ +	+ +
2 minutes	— —	— —	+ +	+ +	+ +	+ +
3 minutes	— —	— —	+ +	+ +	+ +	+ +
5 minutes	— —	— —	+ +	+ +	+ +	+ +
12 minutes	— —	— —	+ +	+ +	+ +	+ +
20 minutes	— —	— —	+ +	+ +	+ +	+ +
30 minutes	— —	— —	+ +	+ +	+ +	+ +

Staphylococcus pyogenes aureus.

Time.	2 per ct.	1 per ct.	½ per ct.	¼ per ct.	1/10 per ct.	1/20 per ct.
30 seconds	— —	— —	— —	+ +	+ +	+ +
1 minute	— —	— —	— —	+ +	+ +	+ +
2 minutes	— —	— —	— —	+ +	+ +	+ +
3 minutes	— —	— —	— —	+ +	+ +	+ +
5 minutes	— —	— —	— —	+ +	+ +	+ +
12 minutes	— —	— —	— —	+ +	+ +	+ +

Gonococcus.

Time.	2 per ct.	1 per ct.	½ per ct.	¼ per ct.
30 seconds	— —	— —	— —	— —
1 minute	— —	— —	— —	— —
2 minutes	— —	— —	— —	— —
3 minutes	— —	— —	— —	— —
5 minutes	— —	— —	— —	— —
12 minutes	— —	— —	— —	— —
20 minutes	— —	— —	— —	— —
30 minutes	— —	— —	— —	— —

PROTARGOL SOLUTIONS.

Streptococcus pyogenes.

Time.	5 per ct.	2 per ct.	1 per ct.	½ per ct.	¼ per ct.	1/10 per ct.
30 seconds	+ +	+ +	+ +	+ +	+ +	+ +
1 minute	+ +	+ +	+ +	+ +	+ +	+ +
2 minutes	+ +	+ +	+ +	+ +	+ +	+ +
3 minutes	+ +	+ +	+ +	+ +	+ +	+ +
5 minutes	+ +	+ +	+ +	+ +	+ +	+ +
12 minutes	+ +	+ +	+ +	+ +	+ +	+ +
20 minutes	+ +	+ +	+ +	+ +	+ +	+ +
30 minutes	+ +	+ +	+ +	+ +	+ +	+ +

Staphylococcus pyogenes aureus.

Time.	5 per ct.	2 per ct.	1 per ct.	½ per ct.	¼ per ct.	1/10 per ct.	1/20 per ct.
30 seconds	— —	+ +	+ +	+ +	+ +	+ +	+ +
1 minute	— —	+ +	+ +	+ +	+ +	+ +	+ +
2 minutes	— —	+ +	+ +	+ +	+ +	+ +	+ +
3 minutes	— —	+ +	+ +	+ +	+ +	+ +	+ +
5 minutes	— —	+ +	+ +	+ +	+ +	+ +	+ +
12 minutes	— —	+ +	+ +	+ +	+ +	+ +	+ +

Gonococcus.

Time.	5 per ct.	2 per ct.	1 per ct.	½ per ct.
30 seconds	— —	+ +	+ +	+ +
1 minute	— —	+ +	+ +	+ +
2 minutes	— —	+ +	+ +	+ +
3 minutes	— —	— —	+ +	+ +
5 minutes	— —	— —	+ +	+ +
12 minutes	— —	— —	— —	+ +
20 minutes	— —	— —	— —	+ +
30 minutes	— —	— —	— —	+ +

ARGYROL SOLUTIONS.

Streptococcus pyogenes.

Time.	30 per ct.	20 per ct.	10 per ct.	2 per ct.	1 per ct.
30 seconds	+ +	+ +	+ +	+ +	+ +
1 minute	+ +	+ +	+ +	+ +	+ +
2 minutes	+ +	+ +	+ +	+ +	+ +
3 minutes	+ +	+ +	+ +	+ +	+ +
5 minutes	+ +	+ +	+ +	+ +	+ +
12 minutes	+ +	+ +	+ +	+ +	+ +
20 minutes	+ +	+ +	+ +	+ +	+ +
30 minutes	+ +	+ +	+ +	+ +	+ +

Staphylococcus pyogenes aureus.

Time.	30 per ct.	20 per ct.	10 per ct.	2 per ct.	1 per ct.
30 seconds	+ +	+ +	+ +	+ +	+ +
1 minute	+ +	+ +	+ +	+ +	+ +
2 minutes	+ +	+ +	+ +	+ +	+ +
3 minutes	+ +	+ +	+ +	+ +	+ +
5 minutes	+ +	+ +	+ +	+ +	+ +
12 minutes	+ +	+ +	+ +	+ +	+ +

Gonococcus.

Time.	30 per ct.	20 per ct.	10 per ct.	2 per ct.
30 seconds	— —	— —	+ +	+ +
1 minute	— —	— —	+ +	+ +
2 minutes	— —	— —	+ +	+ +
3 minutes	— —	— —	+ +	+ +
5 minutes	— —	— —	+ +	+ +
12 minutes	— —	— —	+ +	+ +
20 minutes	— —	— —	— —	+ +
30 minutes	— —	— —	— —	+ +

From the foregoing tests it is evident that in the solutions usually employed, argyrol has practically no bactericidal

power over the streptococcus or staphylococcus; but with the gonococcus, in strengths of 20 per cent. and 30 per cent., it is perfectly efficient. These tests also show why our results with the 10 per cent. argyrol were not as good as with the 20 per cent. argyrol.

So long as a 20 per cent. argyrol solution is efficiently bactericidal with the gonococcus in thirty seconds; so long as the gonococcus is the coccus most feared in the etiology of ophthalmia neonatorum, and so long as the clinical results are practically as good as with the use of 2 per cent. nitrate of silver, and better than with the 1 per cent. nitrate of silver, and this without the annoyances of silver irritation and staining, the writer feels justified in using and advocating the use of argyrol as a prophylactic against ophthalmia neonatorum.

In the curative treatment of ophthalmia neonatorum the writer has also found argyrol of great value. The absence of irritation in strong solutions; the fact that these solutions may be dropped into the eye, at short intervals by the nurse, without injury to the eye, and the fact that these solutions are bactericidal to the gonococcus—all these facts are in its favor, and the writer's present plan of treatment consists of frequent irrigations of the eye with boric-acid solution (every fifteen to twenty-five minutes during the stage of active purulent discharge), cold compresses, and the instillation of argyrol 30 per cent. every two to four hours.

Since the completion of the bactericidal tests reported above, the writer feels that in spite of its many good qualities, argyrol leaves much to be desired in the treatment of ophthalmia, when due to the streptococcus or staphylococcus. It is well known that some of the worst cases of ophthalmia are due to streptococcus infection, and it is hoped that in the near future a silver compound may be found which will possess the blandness of argyrol and be as germicidal to the streptococcus and the staphylococcus as is argyrol to the gonococcus.

In the meantime it seems wise, in severe cases of ophthal-

mia neonatorum which resist the treatment by argyrol, boric irrigations, and cold compresses, to make occasional use of nitrate of silver, 1 per cent. to 2 per cent. solution. In this connection, attention may well be called to the fact that the use of all silver compounds, even argyrol, may be continued too long, and the discontinuance of the silver solution, with the use of boric irrigations, may bring about a speedy recovery.

As the first step in the search for a silver compound which would possess the blandness of argyrol, and at the same time have more bactericidal power, I asked Dr. G. M. Meyer, of the Department of Biological Chemistry, Columbia University, to make a careful analysis of argyrol and compare it with the description given by the manufacturers, Messrs. Barnes and Hille, which is published in the *Medical Record* of May 24, 1902, p. 814. In this published description of the preparation of argyrol, which is naturally vague, the manufacturers call it a "silver vitellin."

Dr. Meyer in his report to me says: "The term vitellin has been applied to various proteins resembling globulins, which, however, belong to the class of nucleo-albumins, or phosphorized proteids. A comparison of the properties of vitellin with the properties of the protein, separated from argyrol by means of hydrogen sulphide, gives no evidence of the presence of vitellin in argyrol. Vitellin is a coagulable proteid and contains phosphorus. A qualitative test for phosphorus in argyrol was negative. Vitellin is insoluble in water, whereas, after separating the silver a proteid was obtained which was soluble in water. As to the nature of this proteid the various tests indicate its proteose character. Argyrol can hardly be looked upon as a combination of silver with vitellin. Its chemical behavior would stamp it as a silver proteose."

THE PRESENT STATUS OF THE PROPHYLACTIC AND CURATIVE TREATMENT OF OPHTHALMIA NEONATORUM FROM THE STANDPOINT OF THE OPHTHALMOLOGIST.

By Lucien Howe, M.D.,
Buffalo.

In attempting to speak for the ophthalmologists in the few minutes allotted to their view of the subject, evidently it is only possible to select a few points, and present a condensed statement concerning them, avoiding as much as possible the discussion of mooted questions. For this purpose it is desirable to consider the subject in three aspects—as it relates to physicians, midwives, and to the public in general. It will be generally conceded that obstetricians will carry out most of the desired prophylaxis more carefully if convinced of its importance than if compelled by law, even if such legislation could be obtained. In dealing with this aspect of our subject, the question is, therefore, how to carry on a campaign of instruction. The reply to this can be given under different headings:

1. Students especially, and practitioners in general, should learn the important fact that this disease produces more blindness than any other. Probably every student is told this more than once, but the fact is given to him with thousands of other facts, and makes no impression on him. Few persons care to be troubled with the recital of figures, still fewer read figures when they are printed, and of those who

either hear or read them, only a small fraction remember them. The most efficient way is to present such facts to the eye. This can be done simply and inexpensively. They give to the student or the practitioner an idea of the enormously important part which this disease plays in comparison with all other diseases producing blindness. My point is that every teacher of obstetrics should be provided with diagrams giving these statistics when he lectures on the subject.

2. The student and the general practitioner should be taught that the preponderance of clinical testimony is largely in favor of a 2 per cent. solution of silver nitrate as the most reliable prophylactic.

This statement is made only after some consideration, because many eminent obstetricians, especially one of the speakers here, has laid stress upon the advantages of another salt of silver. Such data are welcome, and it is unfortunate that more of these accurate contributions to this form of prophylaxis have not been made. The statistics concerning this subject were published by the writer several years ago, and at that time they showed beyond question that the 2 per cent. solution of silver nitrate was more effective than any other drug except sublimate of 1 to 500. The evident objections to sublimate are the intense pain produced, the persistence of the subsequent conjunctivitis, and the fact that it is a dangerous poison. Since this table was made it has been possible to add only a few series of cases.

The point is that the experience in over 28,000 cases shows this to be the best, and until clinical experience has clearly demonstrated that some other method is preferable to this one we should all combine in advocating that solution.

3. Students and physicians should be made to appreciate the fact that while the Credé method is the best thus far known, it is their duty, especially those who serve in large hospitals, to search for other methods which have not the two great

disadvantages of the silver nitrate. It is probable that among the other silver salts or allied compounds some drug could be found which has the advantages of silver nitrate without its disadvantages. As evidence of this we have the very valuable contribution just now made to the subject by Dr. Edgar concerning argyrol; we have also the experience in the Boston hospitals with protargol, which, unfortunately, have not been stated accurately in figures.

As we are all searching for some such remedies, and as the chemical manufacturers, realizing this, have flooded us with a quantity of preparations and varied statements concerning them, it is well to recall the results obtained by a committee appointed for this purpose by the British Medical Association, this report having been made at its last session.

4. More general attention should be called to the law already existing in many States for the prevention of blindness from ophthalmia of infancy. This law in substance is as follows:

The people of the State of represented in Senate and Assembly, do enact as follows:

Section 1. Should one or both eyes of an infant become inflamed, or swollen, or reddened at any time within two weeks after its birth, it shall be the duty of the midwife or nurse having charge of such infant, to report in writing, within six hours, to the health officer or some legally qualified practitioner of the city, town, or district in which the parents of the infant reside, the fact that such inflammation, or swelling, or redness of the eyes exists.

Sec. 2. Any failure to comply with the provisions of this act shall be punished by a fine not to exceed two hundred dollars, or imprisonment not to exceed six months, or both.

Sec. 3. This act shall take effect on the day of nineteen hundred and

Many obstetricians and even some teachers of obstetrics do not know of the existence of the law in their own States.

I am informed that this law in substance has been passed in the following States: New York, Maine, Rhode Island,

Minnesota, Ohio, Maryland, New Jersey, and Massachusetts, and that it now applies to a population of over 20,000,000 inhabitants.

This law is sometimes difficult of enforcement. Ignorant parents are slow to prosecute midwives, and district attorneys are not always efficient, but that it can be made efficient is shown by the fact that three convictions of midwives were obtained in New York State within a year after its passage, and others have followed since. This law, at least, tends to make the midwives careful. It causes parents to appreciate the gravity of an inflammation in the eyes of the infant, and when nurses, in complying with the law, send their reports to physicians, those physicians have at least learned what the law is, although, unfortunately, the man who taught them obstetrics may not have mentioned its existence.

5. The examiners in midwifery of medical colleges and State Boards of Examiners should give at least one question relating to the prevention of ophthalmia of infancy.

6. Physicians who are on Boards of Health or State authorities should furnish free of cost to any practitioner small hermetically sealed tubes of light proof glass, in which a 2 per cent. solution of silver nitrate is always kept ready for use.

7. Physicians on Boards of Health should include ophthalmia of infancy among the contagious diseases, placarding the house where such a case occurs, and quarantining it for a certain number of days. The inconvenience or shame connected with such publicity is a small price to pay for the crime of bringing such a disease into a household. Social ostracism, no matter in what walk of life, is one of the best and most effective methods of punishment.

8. It is desirable to have a law in every State which compels the attendant, at the birth of a pauper child, to use the Credé method for the prevention of the ophthalmia of

infancy, or some other method which has been already proved by a considerable experience to be equally efficient.

The State is the natural guardian of every child, and especially of a child born a pauper. In that capacity the State has a right to demand for such a child the result of the best experience, and as the Credé method is thus far the best which we know, that treatment should be made obligatory.

If such a law were in existence when the parents of well-to-do children objected to the use of silver nitrate, the reason for such treatment would be apparent to them when told that it was obligatory, even in poor-houses.

9. It would be a great step toward the prevention of ophthalmia of infancy if this Society and others of a similar character would pass a resolution to the effect that the failure to apply to the newborn infant a 2 per cent. solution of silver nitrate, or some other remedy which has been proved to be equally effective, furnishes sufficient reason for a suit for malpractice.

This proposition is stated only after considerable deliberation. It is out of place at this point to enter into discussion, but it is safe to say that the facts warrant the statement. It should be said, however, very briefly, that the infant patient has a right to the benefit of what is considered to be the average knowledge and average skill on the part of the obstetrician or the midwife. The facts now at our command concerning the terrible ravages of this disease, the cost to the State, and the fact that it is practically under control, are now so well established that physicians and midwives should know enough to use some effective precaution. It should be observed that such a law does not make it obligatory to use any form of antisepsis in every case. The obstetrician need not use that in any case in which he is morally confident that there is no infection, but such a law would make the practice practically universal, because the obstetrician would

not wish to omit the use of a proper prophylaxis, and then have the disease develop.

Everything which has been said thus far relates to the education, in one way or the other, of students and physicians—especially obstetricians—concerning their duties in preventing this disease.

The next class to consider are the midwives. These women are too ignorant to be educated by appeals to them. This fact is clearly shown by legislation concerning the midwives in the county of Erie, New York State (where Buffalo is located). In 1885 a law was passed requiring their registration, and immediately afterward a campaign was begun to educate them concerning the prevention of this disease. These efforts amounted to practically nothing, until two of them were convicted in accordance with the law already cited. That aroused consternation, and after that they not only reported cases frequently, but it is also certain that at the Eye and Ear Infirmary and other such institutions we now see these cases in a much earlier stage than formerly.

Second, we undoubtedly should have laws which require midwives to use a 2 per cent. solution of silver nitrate or some other equally efficient antiseptic.

Having thus agreed that the medical profession should be educated concerning the importance of this disease and the best method of preventing it, and having agreed that the midwives should be compelled by law to report cases promptly, and also to make no attempt at treating them beyond that first use of the antiseptic, we are brought to the third aspect of our study—the part which the public should play in its prevention.

The most natural course might be to insist upon the prevention of the disease which causes the ophthalmia. That, however, is probably chimerical and is certainly beyond the limit of this discussion. The public should be educated and also restrained by legislation.

This education can be accomplished by means of the societies which are now being established for the prevention of blindness, and also by the dissemination of literature relating to the blind.

The public is also educated by the law which requires midwives to report these cases. The fact that an apparently trifling redness of the eyes is considered of such importance that midwives are compelled by law to report the case in writing, is itself a warning of much effect.

The fact, too, that the laws concerning ophthalmia neonatorum apply also to non-professional midwives has a salutary influence upon the public.

In a short discussion of this kind it is evidently impossible to give more than an outline of the most important points. We must repeat, however, that if progress is to be made in the prevention of blindness from ophthalmia of infancy, it must be through the combined effort of physicians, legislators, and philanthropists.

DISCUSSION ON THE PAPERS OF DRS. CRAGIN AND HOWE.

Dr. A. Lapthorn Smith.—I would like to say that my total experience in obstetrics comprises a little over 1500 cases. Of this number, I have had a little less than 10 cases of suppuration of the eyes. My plan has been that apart from wiping the eyelids with boracic solution I do nothing unless there is some reason for doing something. Whenever there is any sign of ophthalmia, I begin with a 1 per cent. solution of nitrate of silver, and if in two days there is no improvement I increase to 2 per cent. Most cases I have cured promptly by the nitrate of silver given in this way, giving it two or three times a day, a drop or two at a time, either myself or by a competent nurse, provided I think she is a good one, because very often nitrate of silver as given by the ordinary attendants is ineffectual

unless you have a trained nurse who sees to it that the eye is kept open during the instillation. In some cases I have used a 5 per cent. solution of nitrate of silver. Until Dr. Cragin told us, I did not know that the swelling of the eyelids, which I have seen a few times, was due to the nitrate of silver. I thought it was a part of the ophthalmia. But even so, in using a 2 per cent. solution of nitrate of silver I do not recall having lost any eyes, and there were no opacities. I think 2 per cent. nitrate of silver solution is the most satisfactory.

Dr. Walter P. Manton.—When Credé began his work in prophylaxis the blind asylums of Germany and Austria were recruited by from 33 to 75 per cent. of opthalmia neonatorum cases. In attempting to prevent this disease, Credé at first tried a $\frac{1}{60}$ boric acid solution, but this was found to be inert. Then, taking his cue from the ophthalmologists, he began the use of nitrate of silver, employing a $\frac{1}{40}$ per cent. solution. With this strength, however, the silver reaction proved too great, so that a weaker solution was substituted, $\frac{1}{50}$. In his last series of cases published in a monograph issued in 1884, Credé had practically no cases of ophthalmia neonatorum in the institution in Leipzig with which he was connected. There has been a great deal said in regard to the silver reaction or silver catarrh which is produced by this method. I was with Credé some of the time when he was carrying on his experiments and I saw almost no cases of this silver catarrh. We have been using nitrate of silver at the Detroit Woman's Hospital for many years in a 2 per cent. solution, and we rarely get any marked reaction. In his last report Credé states that the 2 per cent. solution is instilled into the infant's eyes, and no further attention is paid to the eyes, and this is practically what we have been doing.

I quite agree with Dr. Cragin that a man practising among the upper classes almost never sees a case of ophthalmia neonatorum. I have never had a case in my own practice, but we do see them in the lying-in institutions, among the lower classes.

Dr. Cragin's statistics are convincing, but we have not had as good results at the hospital with which I am connected. We have tried argyrol particularly, but the results have not been entirely satisfactory.

Dr. Cragin.—In 20 per cent.?

Dr. Manton.—In 20 to 25 per cent. Zweifel wrote a monograph on this subject, in which he advocated the acetate of silver, and from a considerable series of cases showed that it prevented ophthalmia. There was no bacteriological table attached to his article. They were mostly cases of gonococcic infection. He showed that ophthalmia was prevented, and there was practically no reaction from the acetate of silver. I have had no experience with this preparation.

Dr. F. Park Lewis.—It seems to me the question is not so much what we do as how to get something done. As a matter of fact, as one follows the statistics of Dr. Cragin, it is demonstrated clearly that in the hands of you gentlemen, whether you are obstetricians or ophthalmologists, blindness follows gonococcic infection so rarely as practically to be a negligible quantity. In other words, where the precaution is used in giving 1 or 2 per cent. nitrate of silver solution, or the organic silver salts, we know in a large proportion of cases, properly treated, blindness does not follow. We must discriminate between prophylaxis and treatment. We know that the intelligent physician can treat ophthalmia neonatorum and cure it. When it is borne in mind that an enormous number of children born into the world come under the care of ignorant midwives, as no provision is made for the education of midwives frequently, who are not only inexpert, but filthy, it becomes evident that our efforts must be directed, first, toward the ignorant and inexpert midwives, as well as to the indifferent physician in regard to prophylaxis. Then the question of treatment takes care of itself. When it is remembered, furthermore, that every child born is entitled to such protection as will save it from the loss of its most precious organs, the necessity of that protection must come from the State. That has been illustrated by the fact that the State makes provision for the protection of the child before it is born against its murder. It makes provision for the protection of the child in its person and in its property, and if its property is unjustly taken from it the State takes care that the child shall be protected. The State owes it to every child to protect its sight. In the second place, the State owes it to itself to protect itself from

unnecessary burden in caring for those whose eyesight is unnecessarily lost. In the State of New York more than one hundred thousand dollars is expended annually for the maintenance of those who have lost their eyesight through this preventable disease. It is largely a matter of economics, and the State owes it to itself to protect itself from this added burden unnecessarily incurred. When the problem is reduced to its lowest terms, we can say that we have control of a perfectly curable disease and the question is not what it is essential to do, but how shall we get it done. If the responsibility for the protection of every child lies with the State, then the responsibility that the State shall do its duty properly and promptly lies with the medical profession.

Dr. Charles M. Green.—I do not know that I can add to the value of the discussion, except to express the interest we have in this subject in Massachusetts, and to say, briefly, that in the Boston Lying-in Hospital we have followed practically the same methods that have been described by Dr. Cragin. We have used, successively, the 2 per cent. and the 1 per cent. nitrate of silver solutions; we have used protargol and argyrol, and at present we are using 25 per cent. argyrol. I have not come prepared with statistics, but we think we have obtained better results with argyrol than with nitrate of silver.

We have 2500 births a year in our obstetric clinic, and every baby receives prophylactic argyrol treatment. If ophthalmia develops the case is carefully followed by the externe and interne, under the supervision of the visiting staff, until it can be discharged "well." If a case proves intractable it is transferred to the Massachusetts Eye and Ear Infirmary, where, of course, we lose sight of it; but as far as we are able as obstetricians to deal with ophthalmia, we do so.

As to the relative merits of the different silver salts, I think the obstetrician would be glad to learn from the ophthalmologist. We have thought, clinically, that argyrol is productive of better results than the other silver salts; but we would be glad to have the ophthalmologist teach us better.

Two years ago the Massachusetts Legislature enacted that cases of ophthalmia of the newborn must be reported to the

respective Boards of Health, like other infectious diseases; and it is hoped that in this way cases of ophthalmia may always be promptly treated, and that the number of cases resulting in blindness may be materially diminished.

Dr. Henry D. Fry.—The importance of this subject, as many of you know, has been recognized by the American Medical Association, and a committee of three, consisting of Drs. F. Park Lewis, J. Clifton Edgar, and F. F. Wesbrook, has been appointed by the American Medical Association to investigate the subject. I received a circular letter some months ago from Dr. Edgar in reference to this work, asking a number of questions in regard to the different strengths of the silver solutions and their reliability; and, I believe, also something was said in regard to laws regulating the use of these solutions by midwives and doctors.

In the maternity with which I am connected here, where we have used regularly 2 per cent. solution of nitrate of silver, it has effectually controlled the situation. Since I have been connected with this maternity there have been no eyes lost. Sometimes we have ophthalmia developing, but when we do we turn the cases over to the ophthalmologist, and so far they have been cured.

About the time I received this communication from Dr. Edgar, which suggested that we use a 1 per cent. solution of nitrate of silver instead of a 2 per cent. solution, as it was equally effectual, he mentioning that a 2 per cent. solution had caused irritation, I suggested the employment of a 1 per cent. solution. Just about this time an interne of our hospital asked me if he could not give a substitute for the 2 per cent. solution because it irritated the eyes. While it prevented ophthalmia, it caused so much irritation that a substitute was desired. In regard to the value of the 1 per cent. solution, I have used 1 per cent. since, but after hearing Dr. Cragin's results, I think I shall go back to the 2 per cent. solution.

Dr. Alva A. Hubbell.—I have some decided opinions on this subject, Mr. President, and I am very glad you called on me to say a few words.

In the first place, it is admitted, I think, by all obstetricians,

ophthalmologists, or general practitioners, that preventive treatment, so far as its efficacy is concerned, has been clearly demonstrated in lying-in institutions. But I do not think that is the whole question. The question comes up as to whether this should be carried farther than institutional work, and whether one agent shall be used or another, and how it shall be used. In the State of New York we have a law enforcing preventive measures. That law is not very well enforced; it would be of great value if it was enforced. Dr. Lewis made the suggestion that it refers particularly to reporting cases. I hold it is not the patients who have the disease that we are concerned with, but we are chiefly interested in how to prevent the disease entirely. It is prophylaxis which concerns us, and as a prophylactic measure, it seems to me, nitrate of silver has been demonstrated beyond question as an efficient remedy. A 1 per cent. solution is favored by some; a 2 per cent. solution is favored by more; I believe that a 2 per cent. solution is right; but it has been said that a 2 per cent. solution of this drug in hospital cases causes a great deal of irritation. If we go back to the original suggestion of Credé, when he brought out this method of prevention, there will be very little trouble, and in teaching medical students in Buffalo and in my contact with physicians I urge that a 2 per cent. solution should not be dropped carelessly and freely into the eye as a preventive measure, or as a curative measure. One speaker referred to the use of a 2 per cent. solution as a curative measure. I protest against that, because in a certain case in which so strong a solution was used frequently there was almost a fatal hemorrhage from that baby's eyes on account of the reaction that followed. It produces too much irritation. A 2 per cent. solution should never be dropped into the eyes more than once in two or three days, or once a day, and my preference is at the time the child is born. Credé's method was simply to instil between the edges of the lids what would amount to about half a drop. He directed that a glass rod should be used, never a medicine dropper, a little glass rod about one-sixth of an inch in diameter. That is altogether sufficient, and I find even intelligent physicians drop this 2 per cent. solution freely into the eyes, and I believe it is a mistake. Is it any wonder we have this silver reaction?

As to the use of argyrol, I think a 5 per cent. solution of argyrol is almost nil. I think a 10 per cent. solution has slight value, and I never recommend now a weaker solution than 25 per cent., and it is efficacious, and I do not know but what it would take the place of nitrate of silver as a preventive measure.

When should this preventive treatment be used? I have for many years contended that it should be used in every baby's eyes when born. It is not true that ophthalmia is confined to hospital and asylum cases. I have had case after case outside of institutions, and they are not altogether of the lower classes. I have had cases in the higher class. When it comes to the medium classes, I have seen more cases in them than in the lower classes. At any rate, whether it is more frequent or less frequent, it causes trouble, and our only salvation is to use this drug in every case that comes into the world. As to whether the matter should resolve itself into legislative compulsion, it is a question I am deeply interested in, and I am one of those who believe that the committee appointed by the American Medical Association should have the coöperation of these societies. Dr. Lewis, chairman of that committee, and his associates are doing all they can to provide for the general use of this drug, not to wait until the disease is developed in the child, but to prevent it. In New York State we have compulsory vaccination, not because every case is going to have smallpox; we do not wait for a person to come down with smallpox before we resort to vaccination. But there is a law requiring every child in the State of New York to be vaccinated once and so often, and if vaccination is carried out there is no reason why this thing should not be done.

Dr. Seth C. Gordon.—I am not quite sure with regard to the law in Maine, but after talking with Dr. Thompson I am informed that the Act compels, after notification of all cases of ophthalmia neonatorum, the immediate administration of nitrate of silver in all cases.

I want to say a word or two in regard to prophylaxis, as the gentleman who has just spoken referred to it as being the main thing. For the last ten years I have done very little obstetrics. But ever since I went to Portland, after the war in 1865, every

case of midwifery I have attended I personally have washed every child myself. I either did the oiling, or the nurse, or a woman under my supervision, absolutely anointed the child all over with oil or vaselin, or some agent that absolutely dissolved everything that clings to the child. In families where I knew about my cases beforehand they would have a bath-tub ready, but in any case you can find something you can wash the child in. I would take the child from the nurse's hands, and put it into the bath myself, and with a sponge or cloth and plenty of soap, I would give the child a thorough washing. I did that for over thirty-five years. Dr. Thompson was associated with me for a good many years, and can corroborate what I say. Every one of these children I put into a warm bath, and with plenty of soap I washed their eyes and the whole body, after which they were so comfortable that they would kick around and have a good time. I took them out as red as lobsters. Their eyes were cleansed, and everything about them rendered as clean as possible, as soap and water and plain water after could do it. I never saw during the whole of that time but one case of ophthalmia neonatorum, and that occurred two weeks after the child was born. This method of prophylaxis you can carry out yourself. So many doctors say to me, "I never look after the child; as soon as I get through with the woman, I go away, and let the nurse take care of the child." It is the doctor's business to take care of the child. If he does not do it, he is neglecting a most important point.

Dr. Taylor.—I had not intended to discuss this subject; but while I am in accord with what Dr. Gordon has just said, I think there are very few obstetricians who would follow out his directions, although I believe they are very good. In regard to what Dr. Hubbell said about the law in New York State, I think the laws of most States refer particularly to the development of ophthalmia neonatorum after the child is a day or two old. If the midwife or nurse finds on the first or second day that a secretion is forming, then a physician must be informed. As I say, these laws refer to the development of this disease; what we want is that which will prevent the development of the disease.

In the beginning of my medical career I was in general practice, and attended a number of cases of confinement, and while I attended carefully to the washing of the child I did not do it myself, but I always instructed the nurse to do so, and in later years I have instructed nurses particularly as to the method of washing the child's eyes, in order to prevent ophthalmia. I believe that is a very important feature without the use of any drug. Do not misunderstand me, however, as saying that I do not recommend nitrate of silver. I believe in its use; yet there are many, many cases that do not need nitrate of silver solution, and while I believe this, I still think it is safe and good practice to use it in every case.

Dr. Cragin.—I have been informed that through the instrumentality of Dr. Howe, who has left the room, these laws in New York State, which have been referred to, were introduced.

Just a word or two with regard to the teaching of obstetrics. Several valuable suggestions have been made in regard to the teaching of this subject by charts, and other things. I would go one step farther, and say that at the Sloane Maternity we not only teach obstetrics by charts, but we let the students see the mothers and babies. We take them into the hospital and let them live there. Students in the hospital were taught to use a 2 per cent. solution of nitrate of silver, but, no matter what the experience has been elsewhere, in New York City marked irritation of the eyes was produced and there was not only œdema but a discharge from the eyes, so that it kept the nurses busy for a time applying cold compresses and using irrigations to allay the irritation and relieve the edema and get the babies back to their normal condition.

The question arose as to whether we could get the same protection with less annoyance, and we tried 1 per cent. solution of nitrate of silver. The results, as seen from the chart, were not as good, and we then tried 5 per cent. solution of protargol. At about this time argyrol came into notice, and its freedom from irritation caused us to use it, at first in a 10 per cent. solution, but our bactericidal tests showed that this is not strong enough, and our students are now taught to instil a 20 per cent. solution of argyrol, and the charts show that the results have been satisfactory.

Argyrol has little effect on the streptococcus or staphylococcus, but in a 20 per cent. solution it is efficient against the gonococcus, and that is the germ which we fear in a large percentage of the cases. We do not claim to have reached the millenium. We are searching for the light.

The fact that Dr. Hubbell mentioned a case in which nitrate of silver in a 2 per cent. solution caused a dangerous hemorrhage shows that strength should be used with great caution.

We admit that a 2 per cent. solution of nitrate of silver gives protection, but in New York, and in my service, it certainly gave marked irritation, and with a 20 per cent. argyrol solution we have had as good results without this annoyance. We believe that the law should compel the instillation of some salt of silver into the eyes of the baby immediately after its birth.

The question is not so much the variety of silver salt as that some silver salt should be used. With us argyrol has done well. We are hoping for something better.

ECTOPIC GESTATION, WITH ESPECIAL REFERENCE TO THE TREATMENT OF TUBAL RUPTURE.

By Hunter Robb, M.D.,
Cleveland.

Lawson Tait, to whom gynecology is greatly indebted for his elucidation of the subject of "Ectopic Gestation," taught that rupture occurring not later than the twelfth week was the universal termination of tubal gestation. This view was apparently accepted without contradiction for a number of years, when, in 1887, Werth drew attention to the possibility of tubal abortion, and gradually the latter has come to be recognized as the more frequent outcome of tubal pregnancy.

Whitridge Williams, in reviewing the literature down to about 1903, stated that whereas in 1892 Schrenck found only 6 cases of abortion in 610 cases of tubal pregnancy collected from the literature, the more recent reports of Martin, Wormser, Mandl and Schmidt, Fehling and Glitsch, comprising 289 cases, showed that 78 per cent. ended by abortion and only 22 per cent. by rupture. According to Martin, "this termination is the general rule, spontaneous rupture occurring only in those cases in which occlusion of the abdominal end of the tube precludes the possibility of an abortion, or in which the ovum, being inserted in a hernia of mucosa, burrows directly through the tube wall."

Later reports by other authors vary within wide limits,

some giving a lower and some a higher ratio of abortion to rupture. Thus, Runge, reporting 125 cases of recognized ectopic gestation from the Charité and Polyklinik in Berlin, states that there were 73 cases of tubal abortion (58 per cent.), 47 cases of rupture (37 per cent.), and 5 intact tubal pregnancies.

Bandler thinks that the proportion of abortion to rupture is probably as large as 8 or 10 to 1, and makes mention of 60 cases of pelvic hematocele in Schauta's clinic, 55 of which had formed after tubal abortion and 5 after rupture of the tube.

Hirst, giving a series of 74 cases of ectopic gestation says that in a large majority a tubal abortion had taken place.

Newell, in the *Medical and Surgical Reports* of the Boston City Hospital, for 1905, gives a summary of 60 cases of ectopic gestation met with during the previous five years. A careful pathological report was made in every case. All were cases of tubal pregnancy, the tube being intact in 14, abortion present in 22 (36.6 per cent.), and rupture of the tube in 22 cases (36.6 per cent.); rupture into the broad ligament was reported twice, but here the diagnosis was open to question, as the definite pelvic relations were not absolutely made out. The author recognizes that these figures do not agree with the ordinary statistics (that tubal abortion occurs in 75 per cent. of cases of tubal pregnancy), and attributes the discrepancy to the fact that the hematocele in tubal abortion is absorbed spontaneously in a large proportion of the cases, and that only such cases come to operation as present symptoms which demand interference.

In the *Pennsylvania Medical Journal* for September, 1906, C. P. Noble publishes an analysis of the 91 cases of ectopic gestation, which were operated upon by him during the previous sixteen years. His cases are classified as follows: unruptured tubal pregnancy, 7; ruptured tubal pregnancy, 14 (15 per cent.); tubal abortion, 70 (77 per cent.).

The Treatment of Ectopic Gestation. It is hardly necessary to refer to the obsolete methods for a while in vogue which aimed at the destruction and the subsequent absorption of the products of an ectopic gestation through the injection of certain drugs into the fetal sac.

The application of electricity to the same end is likewise only to be condemned.

If we may judge from statistics, in no other field has surgery achieved more brilliant results than in the treatment of ectopic gestation. But it is so often difficult to give figures their "proper bearings," and it is so easy for writers to overestimate the importance to be attributed to this or that factor in their enumerations.

Two plans of treatment present themselves, viz., the expectant and the operative, methods varying widely according to the stage that the pregnancy has reached.

A. Martin has shown that 36.9 per cent. out of 265 cases of ectopic gestation recovered under an expectant plan, whereas 76.7 per cent. out of 515 cases recovered under operative interference.

Schauta, after a careful study of the literature (1891) found that 123 cases operated upon and 121 cases treated without operation, presented a mortality of 5.7 per cent. and 86.9 per cent., respectively.

However, we are inclined to the view of Herman who says, in the *British Medical Journal*, January, 1904, that there ought to be no question of a comparison of the two methods, as each mode has its own place, and, furthermore, we feel that every case should be looked upon and studied as "one unto itself."

The majority of observers have agreed that immediate operation is called for in one class of cases, viz., the early cases in which a positive or highly probable diagnosis of ectopic gestation can be made before rupture or any severe hemorrhage has occurred, and with this view I fully coincide.

The object of this paper is to consider the treatment of another class of cases regarding which there is still quite a diversity of opinion. We refer to those patients whom we find in a state of collapse following the rupture of an ectopic gestation.

We shall cite the views of several recognized authorities, discussing different phases of these "border-line" cases, as they may present themselves.

The position taken by some of the authors in their writings is not clearly defined. Thus to quote from Kelly's *Gynecology:*

"Patients have been successfully operated upon in profound collapse, but I would rather wait a few hours, in some cases, if there are any decidedly encouraging signs of improvement, to gain a maximum effect from stimulation, and then to operate." What if the signs of improvement do not appear?

Williams in his text-book of obstetrics says:

"Whenever we see a possibly pregnant woman in a state of profound collapse, and presenting a deathly pallor of the face, a subnormal temperature, and other symptoms of intra-abdominal hemorrhage, immediate operation is demanded, unless, indeed, her condition is so desperate that death is imminent."

Malcolm Storer expresses his convictions as follows:

"In cases seen immediately after rupture—in collapse, and acute profound anemia, while recognizing that the waiting-policy has able advocates, I personally feel that I should prefer to operate at once, no matter how grave the condition, or, rather, the graver the condition the more prompt would be my attempt to reach the bleeding point. While twelve hours or so may give a patient some hope of recovery from the primary shock, we have no certainty but that meanwhile blood may be coming out of the torn tube quite as rapidly as we can introduce salt solution under the breasts."

According to Storer, one advocate of the waiting policy

has expressed skepticism as to a woman's bleeding to death from a ruptured tube, saying that the hemorrhage will stop of itself when the patient is sufficiently exsanguinated. I must confess that I have come to believe that such a view is worthy of most careful consideration, and that it would be very difficult to show that other factors than the actual loss of blood do not play the main part in the fatal termination in such a case.

Storer does not think the risk that the shock of an operation may take away the woman's one chance compares with that of her bleeding to death. His rule is to get ready for operation, stimulating the patient meanwhile. If she reacts and holds her own, wait, but at the first sign of losing ground, operate. If there is no reaction, operate and give her one chance.

He reports 3 cases in which the patients were in collapse at the time of operation, 2 of whom he lost. In each instance, he states, a large quantity of blood was found in the abdomen, and bleeding was still going on from a ruptured tube.

Cullen has reported a similar case, in which 2.5 liters of blood were found in the abdomen, and from a small opening in the posterior surface of one tube enough blood was oozing to fill a teaspoon in one or two minutes. Recovery followed.

It will always remain a question in such cases whether the manipulations of the structures at the time of operation are not responsible for the hemorrhage, which is found "still going on."

Vineberg, in the *Medical Record*, June, 1906, reports a series of 53 cases operated upon by him, of which there were 14 instances where a very large quantity of free blood was present in the abdominal cavity, and the patients were "in a most profound anemia." In several of the patients there was no radial pulse at the time of operation. "It is amazing to see," says Vineberg, "how in these cases an apparently moribund patient can be brought to life by opening the

abdomen rapidly, ligating bleeding vessels, and injecting saline solution into the veins of the arm." There was but one death in his entire series, and this from double pneumonia on the twenty-first day after operation.

Vineberg feels confident that some of the collapse cases are lost through overhaste on the part of the operator, time not being taken to see whether there is any further oozing.

Of the 60 cases reported by Newell, to which reference has been made, there were 12 patients who entered the hospital with marked signs of internal hemorrhage and shock. In only 2 instances, however, was death attributed to the latter cause. His total mortality was 9; tubal rupture being found in 7 of these cases.

Says this author:

"In cases which are first seen in extremis from shock and hemorrhage, a reasonable interval before operation should be granted to allow for the reaction which usually follows the cessation of hemorrhage. If, on the other hand, no improvement follows within a few hours, or if the patient's condition continues to fail, it may be taken for granted that hemorrhage is still going on, and immediate operation, followed by heroic stimulation, offers the best chance."

In Noble's 14 cases of ruptured tubal pregnancy there were 6 deaths. All were in bad condition at the time of the operation, a number were moribund, and in 8 the abdomen was filled with fresh blood. To quote from his article:

"With free and continuing hemorrhage, shock, and anemia, the prospect of such patients with operation is far from good, the mortality in this group of cases having been 42 per cent. Without operation, however, it would have approached 100 per cent. With a continuing hemorrhage operation is urgently demanded, and hemorrhage is usually persistent in cases of tubal rupture. In exceptional cases, in which a large amount of blood has been lost and the condition of the patient is serious, the question will arise as to whether

operation shall be immediately performed or postponed until improvement has occurred. The proper course in such cases depends upon whether hemorrhage is continuing or has ceased, and also upon whether the patient is so situated that the operation can be performed immediately, should evidences of recurring hemorrhage become manifest. Errors should be made upon the side of prompt operation rather than upon that of undue waiting."

Among the German writers we find advocates of both plans of treatment for the class of cases under consideration.

Von Winckel operates in all cases of free hemorrhage into the peritoneal cavity as soon as possible, and without regard to the shock to the patient at the time. He argues that while with the weakening of the heart's action in cases of severe hemorrhage the bleeding ceases, yet as soon as the heart begins to work better, a recurrence of the bleeding from the ruptured vessels sets in.

Bumm advises, in cases of free hemorrhage, immediate operation. If the pulse is small and frequent, operation should not be postponed for even one-half day; the worse the general condition the more promptly must it be done.

Fritsch expresses his views as follows:

"If a diagnosis has been made of internal hemorrhage from a recently ruptured ectopic pregnancy, absolute quiet until the operation is unconditionally necessary. I would question whether an ice-bag to the abdomen has any advantage. To give subcutaneous saline injections before the operation is also wrong; I advise them directly after the operation, likewise bandaging of the lower extremities.

"What course to take is difficult to decide upon, when one sees a case in which the anemia is marked. To be sure one can and must make an attempt to save life, but often we operate too late from extraneous reasons, not dependent on the physician. Between the time of making a diagnosis and the completion of the preparation for operation too much

time is lost. So much blood is poured out that the patient is unable to endure the effects of an interference as significant as a laparotomy imposes. It will often depend on the incalculable, individual resistance and tenacity of life of the patient whether she withstands the interference."

From Ahlfeld we quote the following timely words:

"If rupture has occurred several hours before the patient is first seen, and she has recovered somewhat from the initial shock, so that the pulse can be plainly felt, it is a question whether it is not safer to keep the woman perfectly quiet; the blood poured out around the ruptured tube has probably come to surround the point of rupture as a tamponing mantle. Place ice-bags or sand-bags on the abdomen and support the patient's strength; above all, give her bodily and mental quiet.

"Be ready, however, to employ surgical interference should there be a recurrence of the bleeding."

To summarize somewhat: It is generally taught that in cases of tubal rupture in the early months of an ectopic gestation, death is almost invariably due to the hemorrhage that takes place, and accordingly the majority of surgeons advocate opening the abdomen as soon as possible and ligating the bleeding vessels. If the total number of deaths could be known that have followed immediate operations for tubal rupture it would be found a considerable one. Particularly is this the case in the country, or in other places removed from the skill of the expert. Therefore, when surgeons advise that all such patients should be operated upon immediately, it is easily to be seen why the treatment might be almost as dangerous as the pathological condition. Naturally, the physician in charge of such a patient would feel that an operation should be done at once and that he must do it. Very often, however, such a man has had little or no experience with the performing of an abdominal operation. Under these circumstances the patient's life might be sacri-

ficed simply from the shock of the operation alone. In some instances also a fatal result might follow from the introduction of an infection. For my own part I believe that when we are called to see a patient who is suffering from a tubal rupture, in the great majority of instances the active bleeding has ceased. Now, if such a patient is given an anesthetic and an abdominal operation is carried out the immediate shock of the operation may well be sufficient to cause her death, but to this is added the risk of producing a fresh hemorrhage by the manipulation of the tissues. Undoubtedly in this way a certain number of the immediate or early deaths following the operation may be accounted for. As a rule, after opening the abdomen in such cases we find a considerable amount of fluid blood present, but it is not often that we see an actually bleeding vessel. When we find spurting or oozing from the rupture in the sac it is generally caused by the blood that has been held under tension in the sac. A large proportion of ectopic gestations are situated in the ampullary portion of the Fallopian tube, and when the embryo passes out through the fimbriated extremity of the Fallopian tube the amount of blood poured out at this time is seldom if ever enough to produce a fatal result. Most of these cases, therefore, would undoubtedly recover without any further serious symptoms. For this reason all statistics dealing with the number of deaths due to a ruptured ectopic gestation are somewhat fallacious. From my experience, in the clinical and experimental side of this work, for the past three or four years, I feel positive that a fatal result due to the loss of blood alone is exceptional. From our examinations also of a considerable number of ectopic sacs, in which a rupture has taken place, we feel sure that it will not often be found that the large vessels, such as the uterine and ovarian arteries, have been torn. During the past four or five years we have carried out with satisfactory results the following method of treating all of our cases of ruptured

ectopic gestation. If there are signs of improvement in the patient's condition (and this in our experience always takes place) we keep the patient under further observation. The change for the better is brought about by carefully stimulating the patient by means of saline infusions under the breasts, and in some instances also by means of hot saline enemata.

If the patient is not vomiting or is not nauseated we administer a stimulant in small quantities by the mouth. In addition to this, we give morphine hypodermically for the pain and the nervousness. External heat is also applied to the body, and the lower end of the bed is slightly elevated. The sulphate of strychnine is also given hypodermically in doses of $\frac{1}{10}$ to $\frac{1}{20}$ grain every half-hour or so according to the indications. While this treatment is being carried out the operating-room is prepared so that it can be used at a moment's notice. We have also carried out this treatment in those cases that we have seen for the first time at the patients' homes. Then, as soon as the woman had recovered from the shock of the rupture she was transported to the hospital, where an operation could be carried out at any time that the necessity might arise. Every patient in our series has gradually improved so that after two or three days, and in some instances after twelve days' time, the operative procedures have been carried out with very little if any shock to the patient.

Analysis of a Series of Twenty Cases of Ectopic Gestation. From an analysis of the 20 cases of ectopic gestation that have come under our personal observation, and received surgical treatment, we may summarize our findings as follows:

1. *Age of Patient.* The youngest patient was twenty-three and the oldest forty-three. Between the second and third decades there were 7, between the third and fourth decades, 12; 1 patient was above the age of forty.

2. *Previous History.* 14 patients had given birth to children; 4 were primiparous and 10 multiparous (2 to 6). There were 6 nulliparæ.

A history pointing to previous pelvic inflammatory disease was recorded in only 3 of the cases. Miscarriage had occurred in 10 patients.

There had been a cessation of the menstrual flow during a period ranging from five to twelve weeks prior to admission in 10 of the patients. In 2 an irregular flow had been noticed for a short time previous to the acute onset of the illness, and in the remaining 7 there had been no menstrual disturbance in 4; the history was unsatisfactory in 3.

3. *Present Illness.* This dated from four days to eight weeks prior to the time of admission. Exacerbations of the primary attack occurred as late as the day of admission in a few cases.

The onset of the attack was in nearly all cases with pain, which was described in 13 instances as being "sudden and sharp," generally in the lower abdomen, but in 1 case it was most intense in the epigastrium. In 3 patients the pain was of a "cramping" or "bearing-down" character, while in 4 it was spoken of as being merely severe. In a number of instances this symptom was chiefly localized to one side of the pelvis.

Pain continuous or increasing in severity to the time of admission was noted in nearly every case of tubal rupture; whereas, in cases of tubal abortion there was usually a history of recurring attacks of pain at intervals of a few hours to a day or so.

Fainting attacks had occurred in 4 instances, 2 of which were cases of tubal rupture, the other 2 of tubal abortion and pelvic hematocele, respectively. 5 patients had had nausea and vomiting. A bloody vaginal discharge, varying from a slight to a profuse flow, and beginning with the onset of pain, or some time afterward, was noted in 15 instances.

4. *Condition on Admission.* In 5 of our patients the condition was regarded as serious and contra-indicatory to immediate surgical interference. All of these showed evidences of shock, and a marked anemia was present, the lowest hemoglobin record being 60 per cent. The general condition of the remaining 15 patients was "fair" to good, none exhibiting symptoms, however, that called for immediate operation.

Signs on bimanual examination pointing to a probable ectopic gestation were noted in 8 of our cases. The temperature was normal or above in 18 patients, the highest being 101.4°; not definitely given in 1; 1 patient in collapse had a temperature of 96°.

5. *Time of Operation.* No patient was operated upon earlier than the day after admission (eighteen to twenty-four hours), and there were only 3 who came to operation so soon. In 1 of these patients a diagnosis of pelvic abscess was thought to warrant an early vaginal puncture. The other 2 patients were in sufficiently good condition to undergo a laparotomy at the time. The remainder of our patients were operated upon at periods ranging from three to twelve days after admission, the average being five days; 8 of the 17 being operated upon on the third day.

Of the 5 patients who were in a grave condition at the time of admission, operation was not considered advisable until the third, sixth, eighth, and twelfth day afterward, respectively, in 4 instances, the other patient being the one mentioned above as coming to operation on the day after admission.

6. *Condition at Operation.* It will suffice to say that of our 5 serious cases all but the 1 operated upon the day after admission showed considerable improvement in their condition over that when first seen. The usual measures of stimulation and keeping the patient quiet had been employed.

7. *Operation.* There were 14 patients treated primarily by abdominal section, 4 in whom only a vaginal puncture was done, and 2 in whom vaginal puncture was followed by abdominal section, in the one case immediately, in the other twenty-four hours later on account of a suspected continuance of hemorrhage. Of these latter 2 cases 1 was an instance of tubal rupture, the other of ovarian pregnancy.

Tubal rupture was found at operation in 9 cases, six times on the left side, three times on the right side. Tubal abortion had occurred in 4 instances; 3 were left sided. An intact tubal pregnancy was met with twice, on opposite sides. Pelvic hematocele was the diagnosis in 4 patients. The unusual case of an ovarian pregnancy has been mentioned. Adherent structures on the two sides called for a bilateral salpingo-oöphorectomy in 3 patients. A unilateral salpingo-oöphorectomy was done in 11 instances, and the opposite tube removed in 9. Both tubes were removed in 2 cases.

The appendix was found involved four times; once it was adherent, and in 3 instances was deeply congested. It was removed from 8 patients.

Clotted blood or bloody fluid or the two together in large quantities were found in the peritoneal cavity in 7 of the abdominal sections (6 tubal ruptures and one ovarian pregnancy). Where an estimation of the quantity is given, the figures vary from 700 to 1500 c.c.

We wish here to raise the question whether one can judge of the actual loss of blood to the patient from the amount of bloody fluid present in the abdomen, as some of the latter is probably a serous exudation resulting from an irritation of the peritoneum by the blood that escapes into the abdominal cavity.

Drainage was employed in 3 of the abdominal section cases, once by the vagina in a primary section, once through both abdomen and vagina, and once per vaginam alone, respectively, in the 2 celiotomies that followed vaginal puncture.

8. *Convalescence and Results.* 11 patients made an uninterrupted recovery—9 of the celiotomies and 2 of the vaginal punctures. In 2 of the section cases, 1 for an ovarian pregnancy, the other for tubal rupture, convalescence was slow; in both of these patients there was a marked anemia, and a left subclavian thrombophlebitis developed in 1 of them.

There were evidences of a right popliteal phlebitis in 1 section case. In another bronchopneumonia was a complication. Following abdominal section for tubal abortion a concomitant uterine pregnancy ended in abortion on the fourth day after operation. Infection of the abdominal incision took place in 1 instance—a tubal rupture. 2 of the patients treated by vaginal puncture for hematocele had a considerable elevation of temperature during the first twelve to fifteen days, and 1 of them a good deal of abdominal pain. Both were discharged free from pain, but with adherent, pelvic structures.

There was 1 death in our series. This occurred in a patient whose convalescence from a celiotomy for tubal rupture had progressed favorably to about the tenth day, when signs of ileus began. The abdomen was reopened on the next day; a volvulus and intestinal adhesions were found present. Death ensued one hour later.

9. *Pathological Findings.* There were 2 specimens of intact tubal mole. Associated with 1 of these there was a hematosalpinx of the opposite side. Expulsion of the ovum from the tube without rupture had taken place in 4 cases. Rupture of the tube was met with in 9 instances, 3 in the isthmic, 3 in the ampullar, and 3 in the infundibular portion of the tube, respectively. Evidences of pregnancy were conclusive in all of these cases. There was no instance of intraligamentary rupture. Well-preserved fetuses were found in 3 cases, the largest being 9 cm. long.

A case of ovarian pregnancy furnished a rare and inter-

esting specimen. Partly embedded in the ovarian stroma was a blood clot the size of a walnut, sections of which showed chorionic villi. A very recent corpus luteum was present. The tube on this side was perfectly normal save for a slight interstitial salpingitis.

Salpingitis in both tubes was present in 8 cases.

A perisalpingitis on the opposite side to that involved was noted in 10 instances.

Tissue removed from the pelvis per vaginam confirmed the diagnosis of hematocele originating from ectopic gestation in 2 cases; in 2 other instances degeneration of the tissues made a pathological diagnosis inconclusive.

I am not prepared to state dogmatically that women do not bleed to death from hemorrhage following ruptured tubal pregnancies, but I am however, of the firm conviction that surgeons are losing many of their desperate cases from over-haste in operating upon them.

The idea that the abdomen must be opened as quickly as possible after seeing one of these patients in order to check the bleeding, which may or may not be going on, seems to have taken deep root in the minds of many gynecologists. If recovery has followed the interference, "we saved our patient;" was there a fatal termination, "the patient died from the previous loss of blood."

We feel that the enthusiasm over our "happy results" has carried us too far, and that a calming restraint to our ideas is needed.

Let us consider the factor of hemorrhage in these cases, and later other influences that may have a bearing on the question. Reports seldom state even in an approximate way the quantity of blood found in the abdominal cavity of the patient. Some say "a large amount," others "a very large quantity," terms which convey but little meaning. What we should like to have in these reports would be a fairly accurate estimation of the amount of blood found

present, and in addition the weight of the patient. We would then be in a far better position to judge to what extent "the previous hemorrhage" has been responsible for the fatal issue in many of the cases.

Physiologists have estimated the total quantity of blood in the human body at about 7.7 per cent. of the body weight. Thus, a woman weighing, say, 130 pounds, would have a blood content of 10 pounds.

Now, "just what percentage of loss," to quote from Howell, "can be borne by the human being has not been determined, but it is probable that a healthy individual may recover without serious difficulty from the loss of a quantity of blood amounting to as much as 3 per cent. of the body weight." This, in a woman of 130 pounds, would be a loss of 4 pounds, or, approximately, 1650 c.c. We question whether so large an amount of blood, or at any rate much more, is found in the average patient of the above weight as a result of hemorrhage from a ruptured ectopic gestation.

We have recently been conducting a series of experiments on dogs, to see if we might not be able to throw some light on this phase of the subject.

It may be worth while to here state briefly some of our observations: In the bitch, as may be recalled, the uterus consists of the body or corpus and its two long horns or oviducts; in the latter fetal development takes place. The oviducts are connected anteriorly with the very short, slender Fallopian tubes; the outer ends of the latter lie very near the ovaries, which are situated posterior and dorsal to the kidneys. The uterine arteries are branches of the pudics, the latter coming from one of the two main divisions of the internal iliacs; they are vessels of considerable size, even as compared with the corresponding arteries in women. The ovarian vessels are, on the other hand, quite small.

With these anatomical differences in mind, a brief resume of the cases is herewith presented:

Experiments.

Dog No. 1. Well nourished. Weight, 6.5 kilos. January 11th. Ether anesthesia. The abdomen was opened through a median incision 6 to 7 cm. long. Pelvic organs apparently normal. The outer end of the right oviduct was cut through, and the right ovary excised. There was no free bleeding at the site of injury. The incision was closed in layers. There was little variation in the pulse throughout the operation. Quick recovery from ether, and an uneventful convalescence.

Dog No 2. Well nourished. Weight about 12 kilos. January 25th. Ether anesthesia. Median incision 4 cm. long. Pelvic organs appearing normal. The right broad ligament was cut through its entire extent, the uterine vessels being severed. There was active arterial hemorrhage, the blood welling up into the abdominal wound. Incision quickly closed in layers. At the end of the operation the mucous membranes showed a distinct blanching. Pulse 140, of small size. Dog conscious thirty minutes after being put to bed. A good deal of vomiting during first six hours. 26th. Dog is up and walking about, showing no signs of pain. This dog escaped from her cage several days later. She had made a good recovery, so far as we could judge.

Dog No. 3. Good condition. Weight about 10 kilos. In "heat." January 30th. Ether anesthesia. Median incision 4 cm. long. Pelvic organs appear congested. Outer end of left oviduct cut through and left ovary excised. The left uterine vessels were now cut across. Free bleeding from the latter and also the ovarian. Incision quickly closed in layers. At end of operation pulse of rather small volume; rate not obtained. Dog conscious soon afterward. February 2d, condition good. Dog disposed to remain quiet. February 6th. Dog bright and active, taking her food well.

Dog No. 4. Well nourished. Weight about 10 kilos. February 2d. Ether anesthesia. Median incision 4 cm. long. Pelvic organs normal. The uterine vessels on both sides were cut across. Very free bleeding. Incision quickly closed in layers. Pulse rapid but of fairly good volume. Dog conscious before leaving table. Given at once, $\frac{1}{3}$ grain of morphine hypodermically. Thirty minutes later dog was standing and drinking water greedily. 6th. Dog suffered apparently but little from operation. Today seems bright, but is not disposed to move about much. 16th. Dog has made an uninterrupted recovery.

Dog No. 5. In good condition. Weight about 10 kilos. February 6th. Ether anesthesia. Median incision 4 cm. long. Normal appearing, pelvic organs. The left ovary was excised, and the uterine vessels on both sides cut. There was the usual free hemorrhage. Immediate closure in layers. Dog conscious on reaching bed. Pulse not very rapid and of good size. Seen thirty minutes later, dog had changed position, but was then perfectly quiet. 9th. Dog has been doing well. Yesterday was eating. Today does not appear so bright. Does not object to being moved. Pulse and temperature good. 16th. Rapid improvement since last note. Dog now active.

Dog No. 6. This is same animal used in Experiment No. 1, *q. v.* February 9th. Dog has made a complete recovery from first operation. Ether anesthesia. Abdomen reopened through former incision. No free fluid or clotted blood found in peritoneal cavity. There were a few delicate adhesions about the pelvic structures. The right oviduct was enlarged and bent upon itself. In the left oviduct were two fusiform swellings, the one about 1.5 cm. from the corpus uteri, the size of a pigeon's egg, the other in the outer half of the oviduct, almost as large as a duck's egg, apparently filled with clear fluid. The uterus and oviducts were now removed in toto by one continuous cut of the scissors from side to side.

Bleeding was profuse. Immediate closure in layers. At the end of operation pulse was hard to obtain; respiration shallow. Dog able to open her eyes. Seen fifteen minutes later, dog was standing on all-fours lapping water. 16th. Dog did not appear to suffer from operation. A few hours afterward was walking about in her cage. No sedative was given. At present seems to be in good condition. 25th. Dog has apparently made her second complete recovery. Incision well healed.

Dog No. 7. Same animal as No. 3, *q. v.* Dog has made complete recovery. Now bright and lively. February 16th. Ether anesthesia. Abdomen reopened through former incision. No blood found in peritoneal cavity. A few light omental adhesions. No pulsation could be detected in the stump of the left uterine artery, nor was there any clot around it. The right uterine vessels were now cut, and temporary closure of the abdominal cavity made by placing clamps on the edges of the divided peritoneum. At the beginning of the operation the pulse rate was 128. The dog was now kept under a light anesthesia. Fifty minutes after cutting of vessels the pulse rate began to show an increased rate, being at this time 136. A steady rise continued during the next thirty minutes, at the end of which time the rate was 156. The clamps were now removed from the peritoneum, and the blood found in the pelvis was carefully removed with gauze sponges. No clotting had taken place. From the cut uterine, active hemorrhage was still going on. No attempt was made to check the bleeding by pressure or traction on the vessel, but gentle application was made with a gauze sponge at the cut end of the artery. Cessation of the bleeding resulted at the end of about ten minutes. Twenty minutes later a subcutaneous infusion of salt solution (400 c.c.) was given. This was nearly all taken up in thirty minutes. It was given to see if the subsequent rise in the blood pressure would bring on a recurrence of hemorrhage from the uterine

artery. No such effect was produced at the end of thirty minutes after the absorption of the saline solution. Gentle squeezing of the end of the vessel, however, was sufficient to expel the clot, which had formed and fresh bleeding began. The experiment was brought to a close at this point, the uterine artery ligated, and the incision closed in layers at once. The pulse rate at the end of the three and one-half hours, consumed in the observation, was 144. 25th. Dog has done well from day of operation. Is now as active as ever. The amount of blood lost during the experiment was estimated approximately, and found to be 240 c.c.

Dog No. 8. Young bitch. Poorly nourished. Weight about 4 kilos. Mucous membranes pale. February 25th. Median incision 6.5 cm. long. Uterus very small, the oviducts slender, cord-like structures. Evisceration of both ovaries; the uterus and oviducts in toto. There was very free bleeding from all the vessels. Immediate closure in layers. But slight change in pulse during operation. Fifteen minutes later dog appeared to be having a hard, shaking chill. Was conscious, but not able to hold up her head. 26th. Dog is bright, but moves very little. March 1st. Dog appears to be gaining rapidly. Is now walking about her cage. Very anemic. Ether anesthesia. Abdomen reopened through previous incision. No free blood in peritoneal cavity. Omentum and intestines adherent in places to bladder, pelvic wall, and rectum; all easily separated. Around the stump of the uterus a small blood clot was adherent. No other clots found present. Forcible manipulations of the stumps of the uterine vessels produced no active bleeding, only an oozing. Dog went into sudden collapse. Revived by artificial respiration.

Dog No. 9. In good condition. Weight about 4 kilos. February 26th. Ether anesthesia. Median incision 6.5 cm. long. Total evisceration of intra-abdominal genitalia as in previous animal. Profuse hemorrhage. Immediate closure

in layers. Mucous membranes became greatly blanched. At close of operation pulse rate was 180, shortly afterward becoming almost imperceptible. Soon after reaching bed dog was conscious, but made no attempt to move. March 2d. Dog is bright and fairly active. Mucous membranes quite pale. Ether anesthesia. Abdomen reopened through previous incision. No fluid or clotted blood present in peritoneal cavity. Stump of corpus uteri brought up and found surrounded by a small clot. No distinct pulsation to be made out in uterine vessels. Well-marked oozing caused by active manipulations of pelvic structures, increased by freshening cut surfaces of previous operation. Closure in layers. Pulse rapid but of good size at end.

Dog No. 10. In excellent condition. Weight 17.5 kilos. March 15th. Ether. Median incision. Uterus very small for so large an animal (has never been pregnant). Uterine vessels cut on both sides. Bleeding by no means so free as in previous cases. Closure in layers. Pulse good at close. 18th. Dog appears as well as before operation.

Dog No. 11. In fairly good condition. Weight about 6 kilos. Considerable enlargement of both thyroids. 18th. Ether. Median incision. Pelvic organs appearing normal. Uterine vessels of average size; cut on both sides. Bleeding very free. Immediate closure. Pulse rapid but of pretty good volume. 19th. Dog today is bright and playful. Abdomen reopened under ether. One to three drams of bloody fluid found present, and a small blood clot on each broad ligament at site of cut ends of uterine vessel. Removal of clot on right side brought on active arterial hemorrhage. Genital organs now excised in toto, corpus uteri being cut across below level of previous division of uterine vessels. There was profuse bleeding, probably two ounces escaping from abdominal cavity before closure was made. At the end of operation pulse was rapid and of small size. Mucous membranes greatly blanched. Dog able to hold up her head

on reaching cage, but making no attempt to rise. 20th. This A.M. dog appears to have recovered well from yesterday's operation. Gets around well. While ether was being administered again dog ceased breathing, and all measures at resuscitation failed. About 6 c.c. of fluid and clotted blood found between bladder and intestines. Intestinal serosa pale.

Dog No. 12. Young bitch, in fairly good condition. Weight 5 kilos. March 21st. Ether. Median incision. Uterus quite small, but vessels of good size for age of dog. Right uterine vessels cut. Free arterial hemorrhage. Immediate closure. Pulse, good volume, not very rapid. 22d. Dog all right today. Under ether, abdomen reopened. 8 to 10 c.c. of bloody fluid and blood clots present. Left uterine vessels were cut, and bled freely. 23d. Dog seems rather weak today, but is able to get around well. Abdomen reopened. About the same amount of blood present as found yesterday. Manipulation of uterus and broad ligaments caused fresh bleeding from uterine vessels. Dog conscious at close. 26th. Dog somewhat dull today. Incision infected and gaping. Killed by forced anesthesia. Several c.c. of purulent fluid found in the pelvis. (Portion of femoral vein removed for study.)

Dog No. 13. In good condition. Weight about 9 kilos. March 25th. Ether. Median incision 5 cm. long. Each oviduct occupied by four fetal sacs, measuring 3.5 x 2.5 cm. Bloodvessels in the broad ligaments dilated, the uterine artery being 2 mm. in diameter at junction of oviduct and corpus uteri. The right vessels were cut at this point. Bleeding was profuse. Immediate closure. At close femoral pulse was just perceptible. Mucous membranes very pale. Seen fifteen minutes later dog lay stretched out, eyes open, breathing quietly; no femoral pulse to be obtained. 26th. Dog appears dull, but drinks freely, and walks around well. Pulse small, 140 per minute. Mucous membranes of better color than yesterday. Given a subcutaneous infusion of salt

solution, 200 c.c. 27th. Condition much better. Dog bright. Pulse 104, regular, of fairly good size. Given $\frac{1}{3}$ grain of morphine hypodermically one-half hour before being etherized. Abdomen reopened. Several c.c. of bloody fluid and clots present. Proximal ends of cut uterine vessels closed, but good pulsation still present in artery. The fetal sacs on the left side were brought out, and opened by longitudinal incisions, which were further torn apart with forceps. These tears were made from the distal sac inward on the inferior, the superior, the anterior, and the posterior surfaces of the oviduct, respectively. There was rather free bleeding from one of the torn sacs. Immediate closure. Seen one hour later dog was still prostrated, pulse 120, of fairly good volume. 28th. Dog in excellent spirits today, quite active. Abdomen reopened under ether. A small quantity of fluid and clotted blood present. Some light adhesions about left oviduct. Mucosa of latter everted at sites of previous tears. Good pulsation still present in proximal stump of right uterine artery. Distal portions of the right vessels severed again and the fetal sac adjacent to the corpus uteri on this side torn open. All the left sacs were again cut open in different places, and the left uterine vessel severed. There was the usual free hemorrhage. Dog conscious on reaching bed; pulse very rapid and small. April 2d. Dog rather dull yesterday and today, but gets around well. Has shown no pain. Abdomen reopened for the fourth time this A.M. Several c.c. of dark, bloody fluid present. Bladder much distended. Omentum adherent to fetal sacs. The left uterine vessels were thrombosed in their severed ends. Definite pulsation in the artery could not be made out on either side. The genital organs were now removed, the right ovary being unintentionally left in. The bleeding from the freshly cut uterines and the ovarian as well, was very free. Immediate closure. At end of operation femoral pulse was 140 to 150, irregular and small. Tongue and

mucous membranes blanched. One-half hour later given ¼ grain of morphine hypodermically. Dog lying with eyes open, but not making any effort to move. Respirations rather shallow but not rapid. A tight binder was placed around the abdomen, and the dog left in Trendelenburg position. Three hours later condition was about the same. Given a subcutaneous infusion of salt solution, 325 c.c. This was promptly taken up, with a slight improvement in the pulse. 3d. Twenty-four hours later dog found in much better condition; able to be on her feet, cheerful, and taking nourishment well. Pulse 120, regular, of fairly good size.

From these few experiments we feel justified more and more in believing that the intra-abdominal hemorrhage, such as we meet with in women in collapse from ruptured ectopic gestation, is not sufficient in itself to cause a fatal termination in these cases.[1]

It will doubtless be maintained by some that our experimental work has shown nothing more than that the dog can withstand a greater loss of blood than the human—a recognized fact—and, yet, it seems to us fair to assume that in five of our experiments we made the tests sufficiently severe to more than equalize the factor of resistance to the loss of blood in the dog, as compared with that of the human being under fairly similar conditions.

In other words, taking into consideration this difference in resistance, by cutting both uterine arteries, and in some instances both ovarians as well, we subjected our dogs to a risk of bleeding to death as great as that incurred by the average woman suffering from a ruptured, tubal pregnancy.

[1] Cases in which the loss of blood *per se* would be sufficient to bring about a fatal termination would seldom be seen in time to save the patient; and it is my firm conviction that in such cases only very rarely (possibly never) is a patient saved by operation. Unfortunately, in not a few of the successful cases reported the details from a pathological standpoint are too meagre to enable us to judge accurately of the exact condition that existed.

How then shall we explain, to what shall we attribute the fatal ending of so many of the serious cases of ruptured ectopic gestations, and what shall be our treatment?

In our view of these cases, we feel that due consideration must be accorded to other factors than hemorrhage, potent as it may be, that jeopardize the lives of our patients.

Let us recall how, in many of these cases, the attack comes to the patient as a stroke of lightning out of a clear sky, and with its accompanying pain brings to the woman's mind the fear of impending death.

We know so little of what we call "shock," that we cannot estimate it in any definite terms, and yet we feel it must play an important role in rendering the patient's condition so serious, so soon after the onset of the attack and before there is any great loss of blood.

Add to this the moving of the patient from her home to the hospital, the dread of the operation, and, finally, the operation itself, and have we added to, or subtracted from, our patient's chances of recovery?

Whatever we do we must lose some cases, but I believe that our percentage of fatalities will be lower if we refuse to add shock to shock, and rather are satisfied to assist nature to bring about reaction before proceeding to a serious operation.

It gives me great pleasure to acknowledge the valuable help of Dr. M. B. Bonta, the late Resident Gynecologist at the Lakeside Hospital, in the preparation of this paper.

DISCUSSION.

Dr. J. Montgomery Baldy.—The views set forth in this paper are so dangerous that I must take decided issue with the author. Dr. Robb has told us that his cases of ectopic pregnancy do not bleed to death. There are lots of cases of ectopic pregnancy where the women have bled to death. Formad, when he was coroner's physician in Philadelphia, put on record some 15 or 20 cases of women who bled to death on account of ruptured

ectopic pregnancy. The belly in these cases was found full of blood. Most of them at that time were never suspected to be cases of ectopic pregnancy. Dr. Robb spoke of these women not having sufficient hemorrhage to kill; that they are the cases that do not die; that they are the cases we operate on early and find simply a clot in the tube or hanging from the tube, with a slight bleeding in the abdomen. Even such patients have bled to death. If it is acknowledged that certain cases of ectopic gestation bleed to death, following primary rupture, we should be unwilling to teach or advocate leaving such cases alone to take their chances. If any of them should recover, it is purely blind luck.

Again, Dr. Robb called our attention to the point that practically these patients do not die from hemorrhage, but from shock, and said that shock would not have occurred if hemorrhage had not gone on. Shock is purely a secondary condition and hemorrhage the primary one. If this is the case, it is our business to put a ligature around the vessel and stop the hemorrhage. Dr. Robb's teaching is exceedingly dangerous, and I thought I would not let it pass without a word of protest.

Dr. C. C. Frederick.—I have seen from 75 to 100 cases of extra-uterine pregnancy. Of this number, 5 have died from acute hemorrhage. In 3 I opened the abdomen and endeavored to save the lives of the patients; 1 of the 5 was almost pulseless when I did the operation; 3 of them in which I opened the abdomen were too far gone, and died. Of other cases of slow hemorrhages, I only lost 2 out of between 50 and 60 cases. I believe that the cause of death in these rapidly acute cases is largely due to hemorrhage and not to shock. I do not see why these cases should have more shock than those which do not die from shock. Hemorrhage is the only important point, in my judgment. We can estimate the amount of hemoglobin in each individual case and determine whether it is shock or hemorrhage from which patients are suffering. If a patient is suffering from shock and not from hemorrhage the hemoglobin index is going to be high, 60 or 70 per cent. If the hemoglobin index drops to 30 or 35 per cent., we may reasonably assume that the patient is suffering from hemorrhage, and the thing to do in such cases is to give the patient the benefit of the doubt by operating.

Dr. Philander A. Harris.—When we are called to any patient in what I term the tragic stage of ectopic gestation, I believe that it will seldom happen that our interest and the interest of the patient will be better subserved by waiting.

My most unfortunate experience in the treatment of such serious cases has resulted from temporizing.

Two weeks ago this afternoon, at five o'clock, a woman in Paterson was taken with severe pain in the abdomen. She sent for her physican, who lives in the same block. In one hour and a half from the beginning of her pain a pulse could scarcely be counted at the wrist. A diagnosis of tubal pregnancy with rupture was made by her physician, Dr. Tuers. He asked that I be sent for. Her husband remarked that if I was called I would at once want to operate. For this reason another physician was secured in consultation. He shared in the diagnosis of the first, and urged the family to have me to see the case with them. I reached the house in about one-half hour from the arrival of the second physician. Not the slightest flickering of the pulse could then be felt at either wrist. The patient was at once removed to the hospital and about three pints of normal salt solution was put in the median basilic vein. Soon after beginning the intravenous injection the patient had a distinctly countable pulse. Her abdomen was opened, a large quantity of blood was removed, together with a tubal gestation. The tubal wall was not ruptured, all the blood having escaped through the ostium abdominale. I believe this woman would have died if we had not promptly operated upon her.

I have followed to some extent the recommendations of Dr. Robb, but with disastrous results.

Dr. J. Riddle Goffe.—I would like to ask Dr. Harris whether, when he opened the abdomen, he found hemorrhage going on, or if it had ceased?

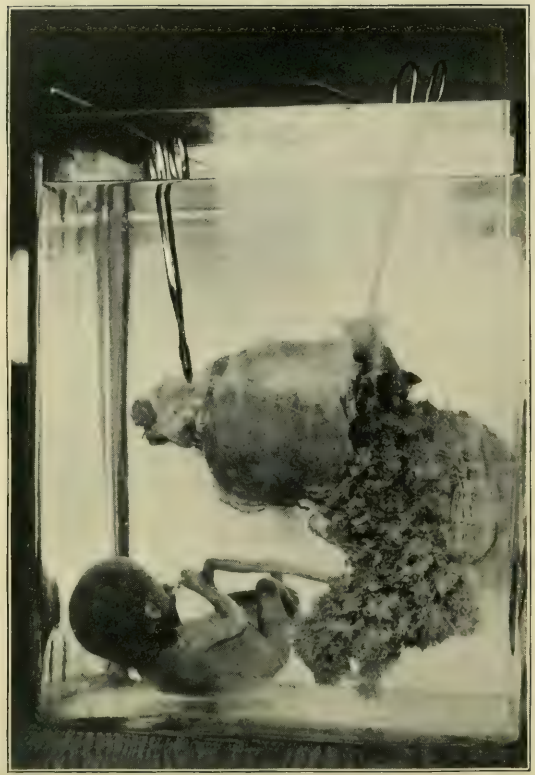
Dr. Harris.—There is no way of telling that. There were blood clots from the ostium abdominale and in the cul-de-sac of Douglas and also quantities of fresh blood.

Dr. Goffe.—Do you believe that hemorrhage was still going on?

Dr. Harris.—I presume she was still bleeding. There were some clots in the woman's belly, but mostly fluid blood.

Dr. J. Riddle Goffe.—I have sympathy with the position taken by Dr. Robb in this matter. I think we have rushed these cases of ectopic pregnancy to operation sometimes altogether too hurriedly, and I believe there is opportunity for a little rest or delay, so that these women can be watched to see if they do not rally from shock. In my series of operations for ectopic pregnancy, in only one woman did I find hemorrhage going on when I operated. In the others the hemorrhage had ceased. I operated in most cases as quickly as I could. However, I think it is just as well to wait a little if we have these women under proper surroundings and circumstances. If we find that a woman is inclined to rally from the shock, let us give her a chance to recover her equilibrium. Let her get over the shock, and be operated on when she has recovered from it. If there is no tendency for her to recover from the shock, then I think we are justified in proceeding at once, with the expectation that we shall find an active hemorrhage. In the patients I operated for this condition, with the exception of one, as I have said, I found that hemorrhage had ceased.

Dr. I. S. Stone.—We are taking a step backward with reference to counselling delay in these cases of ruptured ectopic pregnancy. Lawson Tait taught us the idea which many surgeons had thought of before, that when a patient is bleeding, it did not matter from what vessel, if we could reach the bleeding point we should try to do so and suppress hemorrhage. We know that surgeons who open the cranium do not hesitate, if there is a bleeding vessel, to clamp the vessel in the brain. And the abdomen is not any more sacred territory than the brain. I wish to join the ranks of those who will endeavor to suppress a hemorrhage every time it occurs, and I do not see why we should lay aside a sound surgical principle, when we believe a patient is bleeding, any more than we would waive operation in appendicitis which urgently needed operative interference, on account of rupture having taken place. I believe Dr. Robb has had a series of cases in which there has been slow rupture; a tubal hematoma has formed, and with such cases one can take a certain amount of time. It has not been very long since I lost a case from hemorrhage, which had been held for improvement before operation, and I found the abdomen filled with blood. I think it is our



duty in these cases to suppress the hemorrhage and endeavor to save patients by transfusion who would otherwise die.

Dr. William E. Moseley.—In connection with the paper of Dr. Robb and this discussion, I have a couple of specimens to show and cases to report. I will not read the histories of them.

The first one illustrates the possibility of secondary rupture of the tube. In this particular case there was a tubal abortion, and nearly ten days after the tubal abortion occurred there was a secondary hemorrhage from rupture of the sac. I operated on her two and one-half hours after the indication of the rupture occurred, or was recognized, and the woman is doing well. Hemorrhage from the rupture in the tube was taking place at the time of the operation.

The other case is, in my experience, a rare condition, being a ruptured interstitial pregnancy of three months' duration. The woman had amenorrhea, which continued for three months, and at about half-past eleven in the morning on December 11 she was taken with severe pain and had all the signs of internal hemorrhage, with very great shock. A physician was called in, did not recognize the condition, prescribed for the pain, but did not return to the case until six o'clock in the evening. He then recognized that an intra-abdominal hemorrhage was going on; he had the woman taken to the hospital at half-past seven. I opened the abdomen and removed this specimen (exhibiting). The house staff, before I operated, had given an infusion of salt solution, had administered stimulants, and had resorted to artificial respiration. The pathological specimen is certainly a beautiful one. The woman was moribund when she was admitted and died just before she left the table.

The conditions were such that, had the patient been operated upon soon after the rupture occurred, the bleeding could have been checked with little or no difficulty, and, in all probability, the life of the patient saved.

The pregnancy occurred in the interstitial portion of the right tube, and the rupture opened up the entire right horn of the uterus, nearly involving the uterine cavity. I ruptured the gestation sac in removing it from the abdominal cavity.

Dr. Robb.—I will take but a few moments in closing the dis-

cussion on my paper. I only presented an abstract of it, and the paper in full will answer the objections that have been raised better than I can do in the few minutes at my disposal.

In the first place, I wish to say that I believe the shock that is produced by operation when the patient is already shocked is a dangerous thing. While I believe such patients ought to be operated on, in so doing we are simply adding shock to shock, and if some of these patients can be tided over and not operated on immediately, it is better to do so. Country practitioners have been taught that cases of ruptured ectopic pregnancy must be operated on at once. Men in the country who have had very little surgical experience are liable to lose many of these patients if they operate on them immediately; if they do not, they infect them and they die from infection. Of course, an expert surgeon could operate on these cases quickly; but it is not wise for the country practitioner to pursue such a course. It is better to delay operation in many of these cases. Many good reasons could be advanced for so doing. By delaying a little, the average operator will get better results. If we will go carefully over the statistics of these cases, we will find that many patients have been lost by too hurried operations.

Dr. Stone made a comparison of this condition to appendicitis. It is not an inflammatory condition at all. We are dealing with something that is quite different. It is not anything like appendicitis. We are dealing with hemorrhage, and I do not believe that Dr. Baldy or any other man can absolutely prove that any bleeding is going on. We have had 20 cases in which we have carried out the method I have described, and the women were brought in in a moribund condition. In fact, they were brought in in such a bad condition that it would have been unwise to operate on them. By watching them closely and then operating in a day or two, they get along and do just as well as an appendicitis patient who is operated on in the interval.

The bleeding which occurs in these cases usually comes from a small vessel. It is rare that the uterine or ovarian arteries are involved. In 78 per cent. of the cases of tubal abortions the bleeding is from a small vessel and is small in amount, as a rule, and the loss of blood is not as great as it is generally supposed to be.

INCISION OF THE ANTERIOR UTERINE WALL (ANTERIOR COLPOHYSTEROTOMY) AS A TREATMENT OF CHRONIC INVERSION OF THE UTERUS.

By Reuben Peterson, M.D.,
Ann Arbor, Michigan.

It has been my good fortune to operate upon two cases of chronic uterine inversion. A full description of the first case, an inversion of sixteen months' standing, was published in *American Gynecology*, June, 1903. In this same paper the literature of the conservative operative treatment of chronic uterine inversion was brought up-to-date, and a plea made for the superiority of complete anterior colpohysterotomy (Spinelli's operation) as the ideal operative procedure.

My second operation for chronic inversion occurred in 1904. In reporting this case I shall again carefully review the literature, and tabulate some 70 cases operated upon by various methods. I shall not hesitate to draw freely from my previous article, for, on account of the short life of the journal in which it was published, it has not been readily accessible to those interested in the subject under discussion.

In the former paper I referred to a patient whom I saw in consultation with Dr. G. K. Johnson, of Grand Rapids, Michigan, in 1892. The patient at that time was twenty-two years of age, and the inversion of the uterus followed the birth of her first child. For three or four weeks following the labor she flowed profusely, but the true condition of affairs was not

discovered until Dr. Johnson's examination. I saw the patient in consultation some two months after the accident. Several ineffectual attempts were made under anesthesia to reduce the inversion by taxis, but every effort was futile. Elastic pressure applied by a cup-shaped repositor was also a failure. Thomas' operation was proposed but was not accepted, and the patient passed out of our hands. After the publication of my paper on chronic inversion of the uterus, in which I reported a case of sixteen months' standing, successfully treated by anterior colpohysterotomy (Spinelli's operation), Dr. Johnson wrote me that the patient we had treated twelve years before was still under his charge, and that he had advised her to be operated upon for the inversion, which caused her to lose large quantities of blood at intervals during each month. Accordingly the patient entered the gynecological service of the University of Michigan Hospital, June 27, 1904. The patient was then thirty-four years old and had been a widow five years. There had been no attempts at replacement of the inversion since operation was refused in August, 1892. For a long time thereafter she was weak from loss of blood, but gradually regained her strength, so that she was able to do her housework. She was even able to ride a bicycle, and the only thing she suffered from was rather severe hemorrhages two or three times a month.

Examination soon after entrance showed marked external and internal tears of the perineum, with great relaxation of the vaginal outlet. The inverted uterus filled nearly the entire vagina. The exposed mucous membrane was smooth, and bled easily on handling. The finger could be passed between the tightly constricted cervical ring and the uterus, showing that the cervix was not entirely inverted. The finger could easily be inserted into the cervical ring by pressure on the abdominal wall.

Operation. July 1, 1904, twelve and one-half years after the labor from which the inversion resulted; careful steriliza-

tion of vagina and uterus. The inverted uterus was drawn down, and an incision made in the anterior cervical lip 3 cm. in length down to, but not through, the peritoneum. The attempt to reduce the inversion following this incision proved futile. A transverse incision 5 cm. in length was now made just above the edge of the anterior cervical lip and the vesico-uterine pouch opened. The longitudinal incision in the ring was now deepened through the peritoneum, and lengthened until it extended from the transverse incision to within 2 cm. of the fundus. Only after incising the anterior uterine wall to this point was it possible to reinvert the uterus. The ovaries lay above the entrance to the ring. Together with the Fallopian tubes they were without adhesions and perfectly normal. After the reinversion was accomplished there was a decided ectropion, or rolling out of the cut edges of the anterior uterine wall, so that it was practically impossible to unite the edges of the serosa. Removal of a wedge-shaped piece from each cut edge obviated this difficulty. The incision was united by a continuous catgut suture, reinforced by a few Lembert sutures. The fundus was returned within the pelvic cavity and the cervix united by a continuous catgut suture. The transverse vaginal incision was united with catgut, except for a small opening for a gauze drain between uterus and bladder. A small wick of gauze was also placed through the external os. The patient made an uninterrupted convalescence. Before she left the hospital the cervix and perineum were repaired.

Examination at the time of her discharge showed the uterus in normal position and movable. Dr. R. R. Smith, of Grand Rapids, Michigan, examined the patient for me within a few weeks. He reports the uterus in normal position and quite movable. The patient has no pelvic trouble.

Microscopic Examination. Microscopic examination of the wedge-shaped pieces removed from the uterine walls showed the following: The exposed surface of the mucosa was

covered with organizing blood elements, fibrin, and leukocytes. The tissue was rich in new blood capillaries, with hypertrophy of the endothelial cells. Polynuclear leukocytes were numerous in the mucosa. The glands were practically destroyed. The connective tissue of the stroma was edematous. There was an increase of connective tissue in the submucosa. The muscular layers were more vascular but did not show the sclerotic changes noted in the case reported in a former paper.

The treatment of chronic uterine inversion may be conveniently subdivided as follows:

I. NON-CUTTING PROCEDURES.

1. Manual reposition.
2. Pressure applied to the fundus from below by
   (*a*) Colpeurynters (air, water, mercury).
   (*b*) Tamponade (gauze).
   (*c*) Elastic pressure.

II. CUTTING OPERATIONS.

1. Procedures aiming at an enlargement of the constricting ring from above.
   (*a*) Dilatation of the ring by instruments or fingers.
   (*b*) Incision of the anterior or posterior pillars of the ring.
2. Procedures aiming at enlargement of the ring from below.
   (*a*) Cervical incisions (Sims, Barnes, Polk).
   (*b*) Dilatation of the cervical ring through incision in the uterus (Brown).
   (*c*) Dilatation of the ring through a transverse incision in the posterior cul-de-sac, followed by incision of the posterior uterine wall. (Partial posterior colpohysterotomy, Küstner.)

(*d*) Extension of the uterine incision from the external os nearly the entire length of the posterior uterine wall. (Complete posterior colpohysterotomy, Piccoli.)

(*e*) Incision through the anterior lip of the cervical ring and a small portion of anterior uterine wall. (Partial anterior hysterotomy, Kehrer.)

(*f*) Transverse incision in the anterior cul-de-sac, and incision of the anterior uterine wall from the external os to the fundus. (Complete anterior colpohysterotomy, Spinelli.)

The non-operative procedures will not be considered in detail, but only incidentally in connection with the procedures calling for the use of the knife.

PROCEDURES AIMING AT AN ENLARGEMENT OF THE CONSTRICTING RING FROM ABOVE.

The reason why manual reduction of chronic inversion of the uterus so often fails is because it is so difficult to force the large uterine body through the small, rigidly contracted, cervical ring. Given a yielding ring and the difficulty is practically solved, for through such a ring it is comparatively easy to force a fundus of almost any diameter. But it is only the exceptional ring which yields, therefore taxis in chronic inversion of the uterus has, in the large majority of cases, proved a dismal failure.

It is not strange, then, that with such poor results accompanying manual efforts at reducing chronic inversion of the uterus, certain bolder minds should have considered how best the constriction could be relieved by incision. Naturally such efforts were first directed toward incisions from below, for before the advent of modern aseptic methods the abdominal cavity was only opened as a last resort. It will be more convenient, however, to consider treatment by the abdominal route first.

To Thomas belongs the credit of first opening the abdominal cavity for the purpose of dilating a constricted cervical ring which had resisted every effort at dilatation from below. A steel dilator was used to stretch the ring, through which the fundus was forced by pressure exerted from below. In a second case, while the uterus was reduced by a similar procedure, the result was fatal because of the exsanguinated condition of the patient.

Thomas' first operation was performed in 1869, and was not favorably received by the profession, no doubt, because of the fear attached to penetrating the peritoneal cavity. Malins in 1885 and Mundé in 1888 reported failures by the abdominal method. Malins succeeded in dilating the ring, but could not push the fundus up through it from below. Mundé could not even dilate the ring. Both adopted procedures later used successfully by Brennan. A piece of silk was passed through the fundus from the abdominal side, and back again, so as to leave a loop on the vaginal surface of the fundus. To prevent the silk from cutting through the uterine wall, Malins threaded the loop with a shanked button. Mundé passed a rubber drainage tube, and Brennan gauze, through the loops. Malins was unable, by pulling upward, to indent the fundus in the slightest degree, and eventually resorted to removal of the uterus per vaginam. Mundé actually pulled the drainage tube through the fundus, afterward removing the mutilated uterus from below. Brennan was successful in his case and succeeded in reinverting the uterus, although his patient succumbed to sepsis present prior to the operation. It is not strange that such a principle, the attempt to indent a rigid fundus in a chronic case of inversion, should fail in the majority of cases. Such a fundus is hard and unyielding in chronic cases, and is not readily reduced by pushing or pulling. Recent cases of inversion might succeed by this method, but less hazardous procedures are preferable.

For the sake of comparison and completeness, I have col-

Fig. 1.—Diagrammatic representation of an inversion of the uterus. Notice the cul-de-sac between cervix and body of uterus. The cervix forms the "collar" or "ring" which, being smaller than the fundus, is the mechanical obstacle to reinversion. The bladder does not enter the ring, in fact, cannot under normal circumstances. Hence there is no danger in incising the vagino-peritoneal pouch at *A*.

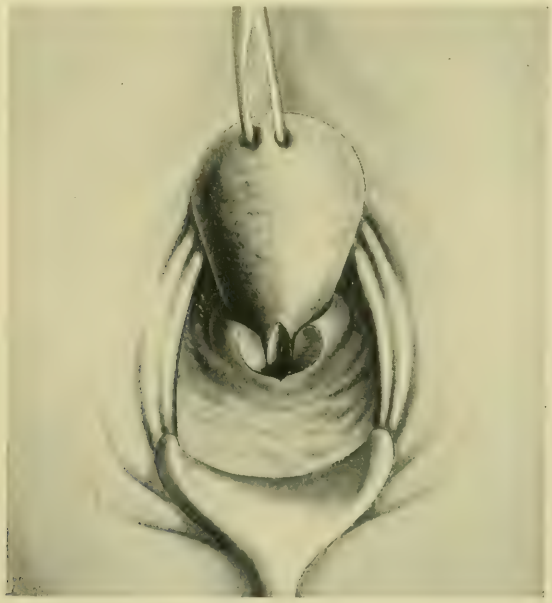


Fig. 2.—Incision through cervical ring. (Sims.) One or more incisions may be made through the cervical ring without cutting through the peritoneal surface of the uterus. In recent cases such an incision in the posterior surface of ring, as represented above, will often suffice for reinversion of the uterus

Fig. 3.—Incision through the posterior uterine wall above the ring (Browne.) Through this incision the constricting cervical ring is dilated, and reinversion accomplished after suturing the incision.

Fig. 4.—Küstner's Operation. Transverse incision in the posterior vaginal fornix. Attempt at dilatation of the ring through this incision. In case of failure, incision of posterior uterine wall from 2 cm. above the external os to 2 cm. below the fundus. Reinversion through this opening and suture of the incision through the transverse cut in the cul-de-sac.

Fig. 5.—Piccoli's modification of Küstner's operation. In addition to the transverse cut in the cul-de-sac the posterior uterine wall is incised from the external os to or nearly to the fundus. Reinversion and suture of the incised wall from the vagina.

Fig. 6.—Kehrer's Operation. The anterior uterine wall is incised from the external os for a varying distance upward. The fundus is reinverted and the incision sewed up as far as the internal os before being pushed through the severed ring. The remainder of the incision is sewed from the vaginal side.

Fig. 7.—Spinelli's Operation (Figs. 7 to 14). The inverted uterus is drawn downward with traction forceps. The anterior vaginal wall is made tense by upward traction and the anterior vaginal wall incised just above the anterior cervical lip by a transverse incision. There is no danger of cutting into the bladder, which is situated higher up. (See Fig. 1.)

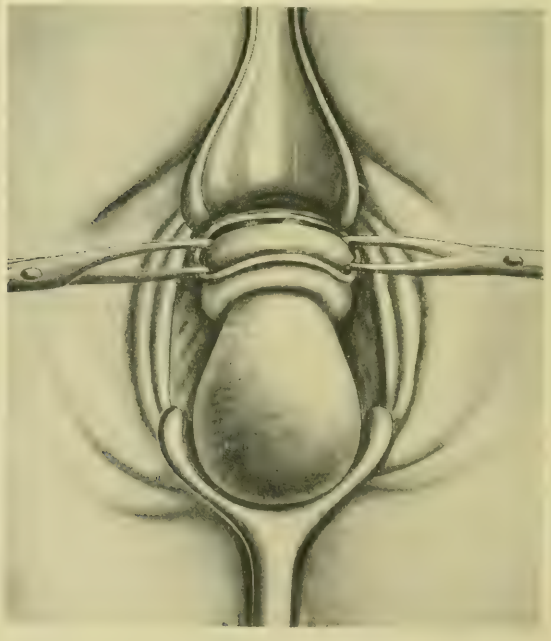


Fig. 8.—The anterior cervical lip is steadied by a forceps at either angle, pulling outward.

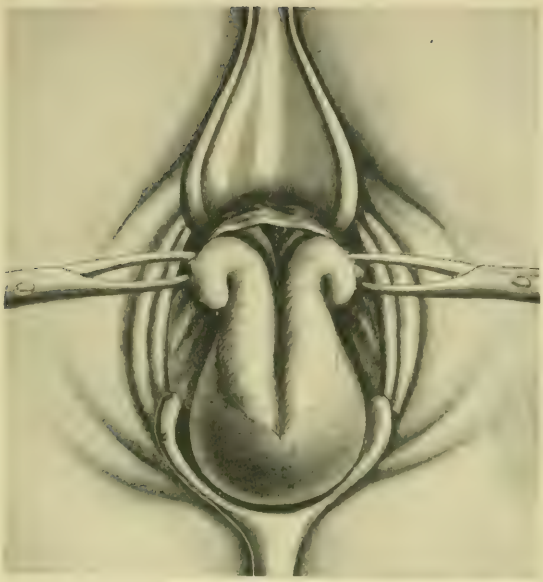


Fig. 9.—With the forefinger placed in the ring as a guide, the anterior uterine wall is incised from the external os to the fundus, or as far as may be necessary for the accomplishment of the reinversion.

Fig. 10.—The split uterus is now reinverted through pressure upward by the thumbs and pulling outward by the index fingers. This is usually easily accomplished without tearing of the uterine tissues.

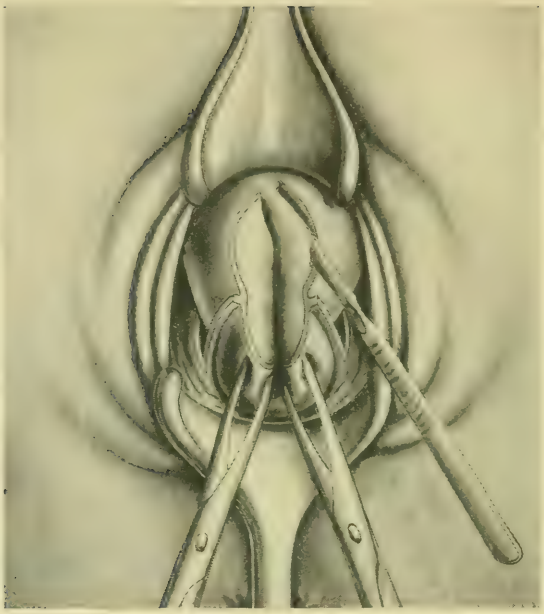


Fig. 11.—After the reinversion has been accomplished there is a kind of ectropion of the uterine walls, so that the peritoneal edges will not come together. To bring this about, a wedge-shaped piece should be removed from each side of the incision. Notice that the fundus has been carried upward, while the cervix is now downward.

Fig. 12.—Line of incision is now sutured. Two layers of sutures may be used, if desired.

FIG. 13.—The fundus has been replaced within the pelvic cavity through the transverse vaginal incision. If there be a tendency for the uterus to drop backward, the round ligaments may be shortened.

FIG. 14.—The transverse vaginal incision is closed except a small aperture for drainage.

lected and tabulated 27 cases of inversion treated by abdominal section. As will be seen by glancing over the table (Table I), some of these cases are not examples of chronic uterine inversion, if an inversion is to be considered recent until involution has taken place, that is, until a month or six weeks after the labor. As will be seen by a careful study of all varieties of inverted uteri, time subsequent to the labor does not always seem to be a criterion of the difficulties of reinversion. Still, in general, it probably is true that the more chronic the case, the more firm and unyielding will be the constricting cervical ring.

There have been 24 cases of inversion treated by abdominal incision. Of these 20, or 74 per cent., were successful as far as reinversion was concerned. Although successful from an operative standpoint, there were four deaths among this number (Brennan, Dobbin, Schmidt, Thomas). Brennan and Dobbin's patients were septic when operated upon, and death in each case resulted from septic poisoning and not from any fault in the operative technique. The same poor judgment was shown in Thomas' fatal case, as the patient was exsanguinated at the time of operation.

There were 7 operative failures, or 26 per cent. All of these patients were operated upon some years ago, and not one of them, probably, would be a failure today. An incision, of greater or less extent, in the anterior or posterior edges of the ring, would have proved successful in the cases of Kelly, Malins, Mundé, or Spinelli.

It is not always as easy as it seems to dilate the ring by the abdominal route. In only 13 cases out of the 27 was dilatation successful, and it is fair to suppose that this would be the first method tried. In 10 cases the ring, either on its anterior or posterior surface, and in 1 case (D'Antona) both sides, was incised.

TABLE I.—Cases of Inversion of the Uterus Treated by Abdominal Section.

No.	Operator.	Age	Duration of inversion.	Attempts at manual reduction.	Dilatation of ring.	Incision of ring.	Additional operative methods.	Results of operation.	Remarks.
1	Brennan.[7]	30	14 days.	Failure.	Dilatation with fingers.	Yes.	Upward pressure from below. Pull from above.	Good.	
2	Brennan.[8]	...	.....	.....	.....	Yes. Failed at reinversion after cut.	Loop formed by passage of silk from abdominal to vaginal surface of uterus.	Good.	Gauze in loop—upward pull. Patient septic at time of operation, died 2 days later of pulmonary edema.
3	Consentino.[10]	36	9 months.	Failure.	Yes.	.....	Pressure from below, upward pull.	Good.	
4	Consentino.[10]	30	7 years.	Failure.	Yes.	.....	Same as in 3.	Good.	
5	Cushing.[11]	25	14 months.	.....	Yes.	.....	Pressure upward from below.	Good.	Slight tear in peritoneum.
6	D'Antona.[13]	25	4 years.	Failure.	.....	Yes. Whole length of uterus incised, anterior, posterior.	.....	Good.	
7	Dobbin.[15]	...	5 days.	Failure.	Failure.	Anterior margin of ring incised, cavity opened.	.....	Good.	Badly infected at time of operation. Died several days later of sepsis.
8	Everke.[19]	...	13 years.	.....	.....	Both anterior and posterior walls of uterus incised.	.....	Good.	Uterus fixed to abdominal wall.
9	Frankenthal.[20]	31	6 months.	Failure. Colpeurynters failed.	Failed.	.....	Pressure from below.	Failure.	Obliged to remove uterus from above.
10	Friedman.[21]	29	1 week.	Failure.	Yes. Reynolds' dilator.	.....	Upward pressure from vagina.	Good.	Small tear in peritoneal coat.
11	Friedman.[21]	37	24 hours.	Failure.	Yes. By fingers.	.....	Upward pressure from vagina.	Good.	
12	Gross.[25]	20	2½ months.	Failure.	Yes. Dilators.	.....	Pressure from below.	Good.	Uterus fixed to abdominal wall.
13	Haultain.[28]	24	1 month.	Failure.	Failure.	1½ cm. in posterior wall.	Pressure from below. Pull up. Failure.	Good.	
14	Kelly.[37]	...	Long standing with prolapse.	.....	Failure. Dilators and fingers.	.....	.....	Failure.	Amputation of uterus from below.
15	Küstner.[39]	...	.....	.....	.....	.....	.....	Failure.	

16	Malins.[40]	19	5 months.	Failure.	Yes.	.....	Button in loop of silk passed from abdominal to vaginal side of uterus.	Failure.	Upward pull on button. Uterus removed from below by elastic ligature.
17	McIntosh.[41]	24	4 months.	Failure.	Yes.	.....	Pressure upward from vagina.	Good.	Peritoneum lacerated, stitch required.
18	Morris.[43]	24	4 months.	Failure. Packing failed.	Failure.	Anterior wall incised.	.....	Good.	
19	Mundé.[44]	24	2 months.	Many attempts failed.	Failure.	.....	Drainage tube on vaginal surface of uterus.	Failure.	When upward pull made drainage tube come through uterus, amputation through vagina, by elastic ligature.
20	Nuñez.[48]	27	3 weeks.	Failure.	.....	Posterior edge of ring incised 1 cm.	.....	Good.	
21	Schmalfuss.[60]	19	12 days.	Failure.	Yes. Fingers.	.....	Pressure upward from below.	Good.	Threatening gangrene of uterus.
22	Schmidt.[62]	28	4 months.	Failure.	Failure.	.....	.....	Failure.	Removal by hysterectomy. Death from septic peritonitis.
23	Spinelli.[65]	...	9 months.	.....	Yes.	.....	Pull from above.	Failure.	Tore round and broad ligaments. Vaginal hysterectomy.
24	Thomas.[67]	23	21 months.	Failure. Many attempts.	Yes. Dilator.	.....	Pressure from below.	Good.	Rupture of vagina between bladder and uterus.
25	Thomas.[67]	...	.....	.....	Yes. Dilator.	.....	.....	Good.	Patient very weak from loss of blood—died.
26	Vignard.[80]	30	3 months.	Failure.	Failure.	Nearly entire posterior uterine wall incised.	.....	Good.	
27	Williams.[84]	21	3 days.	Failure.	.....	Yes.	Pressure from below.	Good.	

SUMMARY OF CASES TREATED BY ABDOMINAL SECTION.

Total number of cases	27	Attempts at dilatation of inversion ring	21
Successes from operative standpoint	20	Successes	13
Failures from operative standpoint	7	Failures	8
Deaths	4	Incision of inversion ring	10
Sepsis prior to operation	2	Operative successes after incision of ring	10
Sepsis subsequent to operation	1	Uterus removed by abdominal hysterectomy	1
Shock from anemia prior to operation	1	Uterus removed by vaginal hysterectomy	5
Manual reduction of inversion tried and failed	20	Uterus fixed to abdominal wall	2

PROCEDURES AIMING AT ENLARGEMENT OF THE RING FROM BELOW.

Cervical Incisions. We find that incision of the unyielding cervical ring from the vaginal side antedates Thomas' first abdominal operation by some years. Aran as early as 1858, and Sims in 1866, in their text-books, advocated one or more longitudinal, cervical incisions in order to divide the circular fibers of the uterine tissue, which were the principal obstacles to the reduction of the inverted fundus (Fig. 2). I am unable to find, however, that either of these authors had an opportunity of putting his ideas into practice. Three years later Barnes was successful in a case of an inversion of six months' duration. By cervical incisions J. M. Duncan was successful in one case, but failed in another.

In 1888, Polk advocated a more extensive cervical incision. He suggested that the anterior vaginal wall be incised, the finger slipped between the peritoneum and cervix, and the constriction be cut through, laying open the entire cervix if necessary. His idea was to avoid entering the peritoneal cavity if possible, but as he points out, even if such a procedure became necessary, the danger would not be greater than after a laparotomy. This was not the original idea of those who advocated vaginal incision of the cervical ring. They preferred multiple incisions down to the peritoneum, to a deep one opening up the cavity. In their fear of wounding this membrane they probably stopped short of separating the constricting fibers of the ring, which, in all probability, accounted for some of the failures.

More recently Hirst and Hare have made use of cervical incisions successfully. Both incised the posterior cervical lip without cutting through the peritoneal surface of the uterus. In both instances reinversion was easily accomplished by taxis.

Dilatation of the Cervical Ring through an Incision in the Uterus (Browne, Fig. 3). Again are we indebted to a member of this Society for a bolder and more rational method of overcoming the contraction of the cervical ring. An account of this new and improved technique for the treatment of chronic uterine inversion antedates Küstner's publication (1893) by ten years, and to my mind it never has received the recognition it deserves.

Browne's method, successfully executed in one case, consisted in the dilatation of the cervical ring through an incision, one and one-half inches in length, in the posterior uterine wall. Through this incision Sims' large dilator was passed up into the cervix, and the dilatation completed by the use of Nos. 2 and 3 of Hank's hard-rubber dilators. The incision in the uterus was then sewed up with silkworm gut, and the fundus easily reduced through the dilated ring by taxis. From his experience with this case Browne concludes that the operation is not more dangerous, but much more certain than prolonged or rapid taxis; that it avoids the danger of bruising the tissue and rupturing the vagina, and that, as an operation for inversion, it is less dangerous than laparotomy. These conclusions hold good in every particular today.

The principle established by Browne is clear and well defined. The operator was urged not to be satisfied with superficial incision or incisions of the contracted cervical ring, but boldly to incise the uterus, even through its peritoneal covering, and from within dilate the unyielding ring. But like many other good ideas, modestly set forth, it did not attract much attention. It was even lost sight of, so that Küstner's suggestion of getting at the ring by an incision in the posterior cul-de-sac seemed to be an entirely new idea.

Dilatation of the Cervical Ring through a Transverse Incision in the Posterior Cul-de-sac, followed by Incision of the Posterior Uterine Wall. (Partial posterior colpohysterotomy. Küstner's operation, Fig. 4.) The technique of Küstner's

operation is as follows: (1) A wide transverse incision in the posterior cul-de-sac, opening the peritoneum; (2) insertion through this transverse incision of the forefinger into the inversion funnel; (3) attempt made to dilate the cervical ring after separating any adhesions found; (4) a longitudinal incision in the posterior uterine wall, as nearly as possible in the median line—this incision should begin 2 cm. above the external os, and end 2 cm. below the fundus, and should extend through the peritoneal side of the uterus; (5) the uterus should now be reinverted by fixing the funnel with the index finger in Douglas' pouch, and pressing in the fundus with the thumb of the same hand; (6) suture of the incision in the uterus by deep and superficial sutures passed from the peritoneal side, by way of the incision in Douglas' pouch; (7) suture of the transverse vaginal incision.

This technique was somewhat modified in Küstner's third case. Instead of fixing the ring by passing the forefinger in the inversion funnel, by way of the incision in the posterior cul-de-sac, a traction forceps was passed through this same incision—inserted into the incised uterine wall, and the reinversion accomplished by traction, rather than by pressure, as in the first case operated upon.

This operation depends for its success upon the rather inefficient dilatation which can be secured by passage of the finger through the constricted ring, and upon the incision in the uterus, which does not include the constricting fibers of the ring. The uterine wall is pressed or dragged inward or downward, while counterpressure is maintained by the finger within the ring. When the ring or the uterine walls are particularly hard and unyielding, Küstner's operation will fail unless the uterine incision be carried downward through the cervix. This modification was first suggested by Piccoli, in 1894, and has been adopted by many operators since that time. That Küstner's original technique is faulty in many cases, in that the uterine incision does not include the con-

stricting ring, is unquestionably proved by a study of 16 cases of Küstner's operation, which I have collected from the literature and tabulated (Table II). From a study of this table it will be seen that Küstner's technique was successful in only 8 out of the 16 cases, or 50 per cent. In 3 of the successes it was found necessary to use traction forceps according to the modification suggested by Küstner himself. There remain then only five successes out of 14 cases where the original Küstner's technique was employed. The reason for this poor showing will be discussed later on.

Extension of Uterine Incision from the External Os nearly the Entire Length of the Posterior Uterine Wall. (Complete posterior colpohysterotomy. Piccoli's modification, Fig. 5.) The extension of the original Küstner incision in the posterior lip of the cervical ring is really more than a modification, as it introduces an entirely new principle as far as the reduction of the inversion is concerned. As has been stated, after Küstner's incision, the reduction was accomplished by a rolling inward and downward of the uterine wall. After the complete division of the posterior lip, according to the suggestion of Piccoli, the completely divided posterior uterine wall can be pulled out laterally while the thumbs press the fundus inward. In this way reduction is always easy and certain. That the Piccoli operation is superior to Küstner's is proved by a study of the following table of 20 cases (Table III). Out of these 20 cases, 18, or 90 per cent. were successful, leaving only two failures. In 5 cases (Borelius, Duret, Gmeiner, Küstner, Pruntsi) the Piccoli incision succeeded after the Küstner incision failed.

TABLE II.—Cases of Inversion of the Uterus Treated by Partial Posterior Colpohysterotomy (Küstner's Operation).

No.	Operator.	Age	Duration of inversion.	Attempts at manual reduction.	Result of Küstner's incision.	Küstner's incision supplemented by	Drainage.	Subsequent position of uterus.	Subsequent adhesions to uterus.	Subsequent pregnancy.	Remarks.
1	Borelius.[4]	30	6½ months.	Failure.	Failure.	Piccoli's incision.					
2	Dienst[14]	31	7 months.	Failure.	Good.	.....	...	Normal anteflexion.	None.	.....	Forceps through transverse incision in cul-de-sac and uterine walls seized from behind. Reinversion aided by pull.
3	Duret.[18]	22	6 months.	Failure.	Failure.	Piccoli's incision.					
4	Gmeiner.[23]	17	4 months.	Failure. Tampon and colpeurynter failed.	Failure.	Piccoli's incision.					
5	Guitérrez.[20]	28	2 months.	Failure.	Good.	.....	...	Retroversion			
6	v. Jordan.[33]	36	7 months.	Failure.	Good.	.....	No.	.....	None.	.....	Anterior lip of cervix torn during attempts at manual reduction. 5 months' abortion prior to pregnancy.
7	Josephson.[35]	27	4 months.	Failure.	Failure.	.....	...	.....	.....	.....	Uterus had to be removed.
8	Küstner.[39]	19	6½ months.	4 attempts. Failure.	Good.	... ..	No.	Normal.	.....	Patient confined 3 years later. Died 4 days later—cause unknown.	See Keilmann.[38] Case in charge of midwife, probable cause sepsis. Physician not called as would have been case with rupture of uterus.

9	Küstner.[39]	52	Uncertain. Caused by myoma size of fist.	.....	Failure.	Piccoli's incision.					
10	Küstner.[39]	33	4 months.	.....	Good.	.....	...	Normal.	None.	.....	Vertical vaginal incision instead of transverse. Forceps used as in Case II.
11	Netzel.[40]	31	8 months.	Failure. Tampon failed.	Good.	.....	No.	Normal.	None.		
12	Perlis.[52]	...	.....	.....	Good.	.....	...	.....	.....	.....	No adhesions to peritoneum.
13	v. Pruntsi.[57]	41	4 months.	.....	Failure.	Piccoli's incision.					
14	Salins.[68]	42	3 months.	Failure. Colpeurynter failed.	Failure.	.....	...	.....	.....	.....	Extirpation of uterus per vaginam.
15	Thompson.[68]	21	14 months.	Failure.	Good.	.....	No.	Normal ante-flexion.	.....	.....	Forceps used as in Cases II and VII.
16	Weber.[82]	...	.....	.....	.....	.....	...	.....	.....	.....	Uterus had to be removed per vaginam.

SUMMARY OF CASES TREATED BY KÜSTNER'S METHOD.

Total number of cases	16	Success after enlargement of incision	5
Successes	8	Vaginal hysterectomy after failure of Küstner's incision	3
Failures	8	Labor following operation	1
Deaths	0	Uterus stated as being in normal position	5
Manual reduction of inversion tried and failed	11	Uterus stated as being retroverted	1
Incision in uterine wall enlarged (Piccoli's incision)	5		

TABLE III.—Cases of Inversion of the Uterus Treated by Complete Posterior Colpohysterotomy (Piccoli's operation).

No.	Operator.	Age	Duration of inversion.	Attempts at manual reduction.	Küstner's incision unsuccessful.	Results of Piccoli's incision.	Drainage.	Subsequent position of uterus.	Subsequent adhesions to uterus.	Subsequent pregnancy.	Remarks.
1	Borelius.[4]	30	6½ months.	Failure.	Yes.	Good.	No.	Retroverted.			
2	Born.[5]	20	5 years.	Failure.	...	Good.	No.	Retroverted.	Slightly adherent.	5 years after operation had living child. Placenta slightly adherent.	Periods became regular.
3	Dahlgren.[12]	18	6 weeks.	Use of colpeurynter caused fever.	...	Good.	...	Anteverted.	.....	Normal delivery 10 months after operation.	
4	Duret.[13]	22	6 months.	Failure.	Yes.	Good.	...	Normal.	.....	Normal delivery 18 months after operation.	
5	Gmeiner.[23]	17	4 months.	Failure. Also tampon and colpeurynter failed.	Yes.	Good.	No.	Slightly retroverted.	.....	.....	Uterine sutures cut through because of friability of tissues. Round ligaments shortened.
6	Graeve.[24]	33	3 months.	Failure. Colpeurynter failed.	...	Good.	Yes.	Slightly retroverted.	.....	.....	Rupture of posterior vaginal wall by colpeurynter.
7	Gutiérrez.[26]	25	2 months.	Failure.	...	Good.	...	Retroverted.			
8	Heinricus.[29]	37	11 months.	.....	...	Good.	Yes.	Retroverted.	Adherent.	.....	Slight tear of serosa.
9	Hue.[3]	19	3 months.	Failure.	...	Failure.	...	.....	.....	.....	Uterus had to be extirpated because of bleeding.

10	Kellmann.[38]	28	2 months.	Failure. Also colpeurynter failed.	...	Good.	No.	Anteflexed.	No.	4 years later had living child. Slight adherent placenta.	
11	Küstner.[39]	52	Submucous myoma.	.....	Yes.	Good.	...	.....	.....	.....	Laparotomy and abdominal fixation. Uterine incision closed from above.
12	Morisani.[42]	25	3 years.	Colpeurynter failed.	...	Good.	Yes.	Normal.			
13	Meyer.[45]	23	5 weeks.	Failure.	...	Good.	Yes.	Retroverted.			
14	v. Neugebauer.[47]	19	5 months.	Failure.	...	Good.	...	Normal.	.....	.....	Uterine walls had to be trimmed because of ectropion.
15	v. Ott.[49]	...	.....	.....	...	Good.					
16	v. Pruntsi.[57]	41	4 months.	.....	Yes.	Good.	Yes.	Normal.			
17	Salins.[58]	42	3 months.	.....	...	Failure.	...	.....	.....	.....	Uterus removed.
18	Sava.[59]	17	3 months.	Failure. Tamponade also failed.	...	Good.	Yes.				
19	Schulze-Vellinghausen.[61]	26	3 months.	Failure. Tamponade also failed.	...	Good.	Yes.	Slightly retroverted.			
20	Westermark.[68]	26	13 months.	Failure.	...	Good.	No.	Retroverted	Slightly adherent.	2 months pregnant at time of last examination.	

SUMMARY OF CASES TREATED BY PICCOLI'S METHOD.

Total number of cases	20	Uterus stated as being in normal position	5
Successes	12	Uterus stated as being retroverted	9
Failures	2	Uterus stated as being adherent	3
Deaths	0	Vaginal hysterectomy	2
Manual reduction of inversion tried and failed	14	Labors following operation	4
Piccoli's incision successful after failure of Küstner's	5	Pregnancy following operation	1
Number of cases in which drainage was used	7		

Incision through the Anterior Lip of the Cervical Ring and a Small Portion of the Anterior Uterine Wall. (Partial anterior hysterotomy. Kehrer's operation, Fig. 6.) In 1898, Kehrer published an account of an operation which he had successfully performed in one case. Without making a transverse incision in the anterior cul-de-sac, he split the anterior uterine wall from the external os up to the middle of the uterine body. Through this opening the fundus was invaginated, while the sides of the split ring were held by traction forceps. Before the uterus was returned into the pelvic cavity the body was sutured down to the internal os from the peritoneal side. The remainder of the incision was united from the vaginal side after replacement. Thorn attempted this operation in one case of chronic inversion, but failed and had to resort to Spinelli's modification before he could reduce the inversion.

Von Herff publishes in a recent number of the *Centralblatt f. Gynäkologie,* April 20, 1907, the only other case I have been able to find where Kehrer's technique has been employed. He succeeded in reducing by this method an inversion of the uterus of five months' duration, where manual reposition and treatment by the colpeurynter had failed.

Transverse Incision in the Anterior Cul-de-sac and Incision of the Anterior Uterine Wall from the External Os to the Fundus. (Complete anterior colpohysterotomy. Spinelli's operation, Figs. 7 to 14.) In 1899, Spinelli modified Kehrer's operation by first opening the anterior cul-de-sac by a wide transverse incision; and, second, splitting the entire anterior uterine wall from the external os to the fundus. He was entirely successful by this technique in one case of chronic inversion of two years' duration. The technique is as follows:

1. Transverse incision in the anterior cul-de-sac (Fig. 7).

2. The anterior lip of the cervical ring is grasped with forceps (Fig. 8), and with the finger as a guide the anterior uterine wall is split from the external os to the fundus (Fig. 9).

3. The reinversion is easily accomplished by pulling outward with the index fingers and pushing inward with the two thumbs (Fig. 10).

4. Removal of a wedge-shaped piece from each uterine wall whenever there is ectropion (Fig. 11).

5. Suture of the anterior uterine incision with one or two layers of catgut (Fig. 12).

6. Replacement of the uterus within the pelvic cavity (Fig. 13).

7. Drainage of the anterior cul-de-sac (Fig. 14).

That the technique is a distinct advance over the others outlined above is shown by the following table (Table IV) of nine cases performed according to this method: Gayet, Jordan, Oui (2), Peterson (2), Spinelli, Taylor, Thorn, with eight successes and no deaths.

THE ABDOMINAL VERSUS THE VAGINAL ROUTE IN THE TREATMENT OF CHRONIC INVERSION OF THE UTERUS.

As far as mere statistics are concerned, the advantage lies decidedly with the advocates of the vaginal route in the treatment of chronic uterine inversion. While my own preferences are for the vaginal operation, as shown by my 2 cases operated upon by the Spinelli method, I am not blind to the fact that statistics are ever deceiving, and that one should not be entirely guided by them in choosing an operation for a certain case. Many of the abdominal operations were performed at an early period, before the perfection of modern abdominal surgery. The vaginal operations, on the other hand, are of more recent date, and for that reason should be more successful.

TABLE IV.—Cases of Inversion of the Uterus Treated by Complete Anterior Colpohysterotomy (Spinelli's Operation).

No.	Operator.	Age.	Duration of inversion.	Attempts at manual reduction.	Drainage.	Subsequent position of uterus.	Result.	Remarks.
1	Gayet.[22]	24	13 months.	Failure.	Yes.	Slightly retroverted.	Good.	
2	Jordan.[34]	24	8 months.	Failure.	Yes.	.....	Good.	
3	Oui.[50]	35	5 months.	Failure.	.....	.....	Good.	
4	Oui.[51]	...	17 months.	.....	.....	.....	Good.	
5	Peterson.[54]	26	16 months.	None.	Yes.	Normal anteversion.	Good.	Vaginal shortening of round ligaments.
6	Peterson.[53]	34	12½ years.	Failure 2 months after labor.	Yes.	Normal anteversion.	Good.	Patient examined 2½ years after operation. Position of uterus normal.
	Spinelli.[55]	27	2 years.	.....	.....	Normal anteversion.	Good.	
8	Taylor.	33	7 months.	Failure.	Yes.	Normal.	Good.	
9	Thorn.	31	5 months.	Failure.	Yes.	Normal.	Good.	Vaginal fixation. Kehrer's incision failed.

SUMMARY OF CASES BY SPINELLI'S METHOD.

Total number of cases	9	Spinelli's incision, successful after failure of Kehrer's	1
Successes	9	Number of cases in which drainage was used	6
Failures	0	Uterus stated as being in normal position	5
Deaths	0	Uterus stated as being slightly retroverted	1
Manual reduction of inversion tried and failed	6		

A *résumé* of all abdominal and vaginal operations, no operation being counted twice, gives the following:

ABDOMINAL.

		Per cent.
Total number of cases	27	
Total successes	20	= 74
Total failures	7	= 26
Total deaths	4	= 15

VAGINAL.

		Per cent.
Total number of cases	43	
Total successes	38	= 88
Total failures	5	= 12
Total deaths	0	

Today any competent surgeon ought to be able to reduce the inverted uterus successfully by either route. But I firmly believe there are certain disadvantages connected with the abdominal route, which ought to turn the scale in favor of the vaginal method of operating.

More Shock by the Abdominal Route. In many cases of chronic inversion the surgeon has to deal with a patient exsanguinated by frequent and profuse hemorrhages from the exposed mucosa. Such anemic patients do far better when the operation is performed from below. An abdominal section on a patient with 40 per cent. hemoglobin, or under, is a hazardous procedure and ever will be. At times it is next to impossible to check the uterine oozing long enough to increase the percentage of hemoglobin. Hence any procedure which diminishes the danger of shock in these anemic patients should be selected.

A study of the reported cases will show that when an attempt is made to dilate the ring from above, the effort is liable to be very time-consuming. Hence, in the case of a weakened patient, where rapidity of the operation is very important, the surgeon would be forced to give up dilatation of the ring and depend upon incision of its anterior or posterior pillars.

But any cutting operation can be more quickly and accurately accomplished from below.

Superiority of the Vaginal over the Abdominal Incision of the Ring. The inverted uterus being in plain sight, and capable of being dragged to the vulva, is in a much better position for incision than is the inversion funnel from above. At first sight this would seem incorrect, but when one has had an opportunity of examining a case of inversion, he can hardly fail to be convinced of its truth. If to this be added the difficulties of reinversion, after the incision has been made from above, as compared with those where the vaginal incision is employed, the advantages will be seen to more and more lie with the vaginal route.

Ease with which Adhesions of the Appendages can be Treated from Above. As Küstner has pointed out, and his observation is amply confirmed by a study of the reported cases of chronic inversion, adhesions are rarely present when the organ is inverted; and even in case they be present, they can equally well be treated from below. They lie directly under the hand of the operator because of the relaxation and prolapse of the uterus and appendages.

Septic Cases Better Dealt with from Below. It is questionable whether reduction should ever be attempted when the inverted organ is septic. It certainly would seem as if the mucosa were in the best possible position for energetic treatment, unless the sepsis be caused by necrosis due to strangulation. In this case it would not be justifiable to replace the uterus, as the dangers of absorption would be increased rather than diminished. If, however, for any reason it should seem best to replace such inverted uteri, it would be the height of folly to expose clean pelvic and abdominal peritoneum to the dangers of septic contamination. Such cases would best be treated from below.

Objections to Manipulations from Below after the Abdomen is Opened. Finally, it is always a disadvantage for the sur-

geon performing an abdominal operation to have to combine with such operation manipulations through the vagina. Yet a study of the reported cases shows that pressure upward by way of the vagina was almost invariably necessary in order to accomplish reduction, whether the constricted ring was dilated or incised. Either such manipulations must be performed by the operator with one hand, while he makes counterpressure with the other hand from above, or else the work must be entrusted to an assistant. In the first instance there is always added danger of septic contamination, in the second event, no matter how good the assistant, his services cannot be as efficient as those of the operator. These objections are not met by the statement that after dilatation or incision of the ring the parts can be pulled up from above. Such pulling or drawing upward has been most disastrous, because of the danger of tearing the friable tubes and ovaries.

Choice of Vaginal Operation. Just as I am a firm believer in the advantages of the vaginal over the abdominal method of operating for chronic uterine inversion, so am I a strong advocate for anterior colpohysterotomy, the Spinelli operation. Still, I am free to confess, that in reality there is not so much difference whether one chooses the anterior or posterior uterine wall for the incision, provided he be prepared to enlarge it sufficiently, so that all tearing or mangling of the tissue may be avoided during the reinversion. It will not be necessary to make a long incision in all cases of chronic inversion. Sometimes it will not be necessary even to incise the peritoneum, as the cases of Barnes, Duncan, Hirst, and Hare have abundantly proved. The mere cutting of the constricting fibers of the ring, in cases such as these, will prove sufficient to accomplish the reduction. Hence, I believe one should proceed as I did in my last case. The incision should be made down to but not through the peritoneum. If the case be of the kind where the inversion is easily accomplished after such an incision the latter will suffice. In fact, such an

incision would probably be successful in most of the recent cases of inversion before involution has occurred. But it will only occasionally suffice in the cases of long-standing inversion. Then it should be lengthened at once, prolonged and mutilating efforts being avoided. Whether the anterior or posterior wall be selected for this trial incision, its failure calls for a transverse cut through either the anterior or posterior cul-de-sac.

No Danger of Wounding Bladder by the Anterior Incision. At first sight it might seem as if there would be grave danger of wounding the bladder when the vesico-uterine pouch is opened, but a little consideration will show that such is not the case. The bladder is not drawn into the inversion funnel. It is only loosely connected with the uterus, hence it remains behind and clear of the transverse incision which is made along the edge of the anterior cervical lip. The constant filling of the bladder is another factor which will always tend to keep it up out of the funnel and away from the path of the incision. I think this is an important point, for many have decided, as did Hare, against this route, because of possible injury to the bladder. If this fancied danger can be removed, why is it not preferable to incise the anterior uterine wall? Certainly, many thousands of vaginal operations have proved that anterior vaginal celiotomy is far simpler and easier than the posterior operation. Why does not the same hold true as regards the incision of the anterior wall in chronic inversion?

If, then, the incision in the anterior lip of the cervix does not prove effectual, at once make the transverse incision in the cul-de-sac and incise the cervix from the external os upward as far as may be necessary. After every centimeter incised, reinversion can be gently tried until the proper limit has been reached, when the uterus can be replaced easily and without force.

Danger of Retrodisplacement after Incision of the Posterior Uterine Wall. One of Spinelli's objections to the posterior

uterine incision was the tendency to adhesions along the line of incision and resulting retrodisplacement of the uterus. I have noted this in Tables II, III, and IV, and find that in the 7 successful cases of Küstner's operation (Table II) the uterus is mentioned as being in normal position 5 times, which does not look as if the incision in the cul-de-sac had much influence upon the position of the uterus. However, the splitting of the posterior cervical wall, and the extension of the uterine incision upward, apparently has the greatest effect, because from Table III (Piccoli's operation), out of 14 cases where the position of the uterus is noted, it is mentioned as being retroverted in 9, too large a proportion to be merely accidental. It is difficult to say why splitting the entire posterior wall should be followed in so many cases by retrodisplacement, but such seems to be the case.

Turning now to Spinelli's operation we find the position of the uterus mentioned in only 6 cases, but it was noted as being retroverted only once.

If it be feared that permanent retrodisplacement will follow the vaginal operation for inversion it is much easier to make some suspension operation through the anterior than the posterior cul-de-sac. In my first case I suspended the uterus by passing catgut sutures around each round ligament, and passing them out through the vaginal wall. This effectually prevented backward displacement of the uterus, and brought the line of suture up against the bladder wall. Because of the danger in case of subsequent pregnancy, vaginal fixation should not be performed.

The Closing of the Uterine Incision. First of all, one must be able to bring together accurately the cut edges of the uterine incision, if one is to make a satisfactory closure. This was not at all easy in at least four instances, Thorn, Neugebauer, and my own 2 cases. In the latter cases there was a decided ectropion of the cut edges, so much so that it was impossible to bring the serosal edges together. In both cases I acted upon

Taylor's suggestion and removed a wedge-shaped piece from each cut edge. The suture was much easier in the second case because more of a wedge was removed, thus allowing better coaptation of the serosal edges.

The wall may be sewed in layers with a continuous or interrupted suture according to the fancy of the operator.

Drainage. Drainage was employed 13 times in the 43 cases. It would seem to me a little safer to leave in a small gauze wick for drainage, whether the incision be made in the anterior or posterior cul-de-sac. Still the future may show that the undrained cases do better than those where drainage has been employed. We are more apt to drain in a new and untried operation. As we become more familiar with the technique we are more liable to discard drainage, and such may be the case here.

Pregnancy after Incision of the Uterus. While there may be important histological changes such as atrophy, and at times almost complete disappearance of the uterine glands because of the position of the uterus in chronic inversion, it is fair to assume that so long as menopausal changes have not occurred, enough normal endometrium will remain so that regeneration will promptly follow reinversion. If this be true, and the appendages remain normal, it ought to be perfectly possible for pregnancy to supervene, no matter of how long standing the inversion may have been. This assumption is shown to be true by such cases as that of Tyler Smith, where a normal pregnancy and labor followed reduction by the colpeurynter of an inversion of twelve years' standing. What then would follow pregnancy and labor when part of or the entire uterine wall has been incised in bringing about the reduction?

From experience with Cesarean section, both vaginal and abdominal, it is fair to assume that rupture of the uterus will not follow labor after inversion operations. Rupture of the uterus occurs not so much as a result of the uterine scar as from violent efforts, on the part of the uterus, to overcome

the obstacle imposed by a contracted pelvis, etc. Hence, when these obstructions are absent it does not seem probable that rupture will occur, no matter if nearly the entire uterine wall be incised.

We are now in a position to prove that such an assumption is correct. Pregnancy, following incision of the uterus for inversion, has occurred five times. In Westermark's case the patient was two months pregnant at the last examination, so we have no means of knowing how she passed through her labor. In the other cases (Born, Dahlgren, Küstner, and Keilmann) we have more accurate information. In Dahlgren's case it is stated that the pregnancy was not interrupted, the assumption being that the labor was normal. In Born's and Keilmann's cases the labors apparently were normal, but the placentas were both adherent. Convalescence in each case, however, was uninterrupted. Küstner's patient became pregnant three years after the operation, and died four days after confinement. Keilmann argues that inasmuch as the patient was attended by a midwife and no physician was called, as would have been the case if the uterus had ruptured, that death probably was caused by sepsis.

Operation much Better than Prolonged Efforts at Reduction by Means of Taxis. The history of the treatment of chronic uterine inversion has not been creditable to gynecologists until very recently. Old ideas of refraining from operation, and making unjustifiable efforts at reducing the inversion by taxis, have prevailed and still influence our treatment to a large extent. Why should we repeat the dismal attempts at manual reduction so often followed by failure or unjustifiable rupture of, or injury to, the soft parts? Why should we use taxis for an hour, every minute of the time meaning a large loss of blood in a patient, perhaps already much exsanguinated? Why in the light of the literature of the subject do we try taxis at all? Why not at least cut through the ring down to the peritoneum first? Then taxis may be employed to

advantage. It may look easy to force a large fundus through a small constricted ring, but the history of such attempts show the opposite to be the case. In my own two cases I tried to restrain myself from what my experience years ago, with the second patient, had proved to me to be foolish treatment. I did not waste my time in attempting manual reduction, and the outcome in both cases showed the wisdom of such a decision. Both patients were weak from loss of blood, and taxis would have meant still more bleeding. As it was, I could not reinvert the uterus in either case until the anterior uterine wall had been incised nearly to the fundus.

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DISCUSSION.

Dr. B. Bernard Browne.—Mr. President: I have listened with a great deal of pleasure to Dr. Peterson's paper, and his description of the technique of his operation. I have had 6 cases of inversion of the uterus; 2 of them were acute cases; 3 of them were produced by fibroid tumors growing from the uterus, causing inversion, and 1 case of chronic inversion of the uterus of six years' duration, in which all ordinary means had been used, and which came under my care in 1883. In that case, after using other procedures without success, I did an operation which I think is more simple, easier, and less dangerous than any of the operations that have been advocated since, and none having been advocated before that time, except the operation of Dr. Thomas, of opening from above. My operation, which was described in a paper on "Inversion of the Uterus," read before this Society in 1899, and published in its Transactions of that year, p. 256, was simply to pull the uterus down past the vulva, turning it up toward the symphysis, making an incision in the posterior wall, inserting a Sims dilator through the opening, stretching the constriction, and afterward follow it by a Hanks hard-rubber dilator, inserting the finger to feel that the parts were perfectly free, then sewing up the incision and reinverting the fundus. This operation can be done in ten or fifteen minutes by anyone who can do any ordinary operation. I do not advocate it in cases of acute inversion of the uterus, because in acute inversion the uterus can generally be reinverted by the ordinary means.

We know that as far back as the time of Hippocrates he advocated putting the woman on a ladder and turning the ladder

upside down, pouring oil into the vagina and causing the reinversion. That was by means of posture, and was adapted to all recent cases. The case I refer to was one of six years' duration, and I thought a very simple one. In cases in which there is a fibroid tumor you pull down the uterus; pull the tumor outside of the vulva, enucleate it, and reinvert the uterus. There you have not the condition of a constricted cervix to deal with, the tumor keeping the canal open. I simply remove the tumor and invert the uterus in such cases. In cases of chronic inversion the canal becomes smaller, sometimes not larger than a goose-quill, and you have a condition to deal with of passing a large body, larger than a hen's egg, through a canal not larger than a goose-quill. You must dilate that canal. I will make a blackboard diagram, so that you will understand this operation more clearly (illustrating on blackboard).

Dr. E. W. Cushing.—My experience has been limited to one case of chronic inversion, but in order to treat it I operated through the abdominal wall for the following reasons, which I think will hold good: You cannot tell whether there are adhesions of the tubes and ovaries, or what their condition is, and you know positively the ligaments have been for a long time overstretched. It seems to me, vaginal operations, like many other operations, are transitional. Now, we can open the abdomen with safety from above, in these cases, and it is no more difficult to do this than to make a cut from below. You can see what you are doing; you can dilate without squeezing the tubes; you can cut, if necessary, and if desirable; in case there are adhesions of the tubes or ovaries you can separate those adhesions. If there is any tear in the uterus in passing it back you can repair it. You have the facility of shortening the round ligaments, thereby fastening the uterus up in place. You do not necessarily open through into the vagina; therefore, I think the abdominal operation is the best and the one that will finally prevail.

Dr. Peterson.—I was unable to read all of my paper because of lack of time. In it I take up the various points mentioned by Dr. Cushing. In my judgment the abdominal operation is not as good as the vaginal. In this respect I disagree with Dr. Cushing, and I do not believe the abdominal operation will in the

future be generally adopted, for the reasons set forth in my paper. The dilatation of the constricted cervical ring from above is by no means easy, and most operators have had to split the ring before the reinversion was accomplished, and if you do that you may as well split it from below.

In my paper I have spoken of my appreciation of Dr. Browne's work and of his operation; still I do not think it is an operation which is as good as the one I advocate. In my last case, for instance, which was of twelve and one-half years' standing, it would have been impossible to dilate the ring, through the incision in the uterus, and then reduce the fundus through this ring. After cutting the entire cervix, so that there was no longer a ring, I had to split the uterus up to the fundus before I reduced the inversion.

FIG. 1.—Inversion of the vagina. Direct view

FIG. 2.—Inversion of the vagina. Side view.

FIG. 3.—Transfixion of the vagina with the round ligaments for cure of inversion of the vagina.

INVERSION OF THE VAGINA.

WITH THE DESCRIPTION OF A PRESUMABLY NEW OPERATION FOR ITS RELIEF OR CURE.

By Philander A. Harris, M.D.,
Paterson, N. J.

In this paper I employ the term inversion of the vagina to indicate complete prolapse of the vagina, and the consequent descent of more or less of the pelvic viscera in the hernial sac. In so-called descensus uteri—procidentia uteri, or prolapse of the uterus—the urethra, bladder, rectum, and other pelvic and abdominal viscera contribute more or less to the formation of the mass, as also occurs in its clinically related analogue inversion of the vagina.

When this condition of descensus, or hernia, continues after removal of the womb the uterus can no longer figure in the nomenclature of the condition, and the writer assumes that the vagina is entitled to the next first place in a naming relation. Inversion of the vagina can only be said to occur where the womb or most of it has been removed.

I have met with but 3 cases of inversion of the vagina. I performed the primary vaginal hysterectomy in 2 of these cases. The first one was operated upon about seven years ago and has been lost from view. The second case presented herself to me with complete inversion of the vagina four years after I had removed her uterus by the vaginal route for fibroid. This patient's womb had not come outside of her body at any

time preceding the hysterectomy. She had, however, since the removal of the womb, consulted another physician who performed for her, in another hospital, some plastic operation upon the vagina for the relief of the inversion without any good effect whatever. For the cure of the inversion of her vagina I operated upon her as follows, in the Passaic General Hospital, on December 4, 1906:

The vagina was first disinfected, then returned to place, and so tightly packed with to-and-fro gauze as to distend it. A median line suprapubic incision was then made, the round ligaments found and dissected from their imbedments. A hole was then made at each side of the vagina near its fundus. The right round ligament was threaded through these apertures from right to left, and the left ligament was then made to transfix the vagina by threading it through the same apertures from left to right; each distal end was then drawn taut and sewed to the base of its fellow, and also stitched with catgut through the vagina at the points between immergence and emergence. A small perineorrhaphy was then resorted to.

When the patient left the hospital, the fundus of the vagina was located so high that I could not reach it with the examining fingers. Examination of the case three months afterward gave no evidence of prolapse of the bladder, rectum, vaginal walls, or the vagina itself. The woman lives a very considerable distance in the country, and I am not able to give a later report than stated above.

The second and last case upon which I performed this operation appeared in the charity service of one of the hospitals where I work, with the history that she had suffered for many years with prolapse of the womb, and had entered a neighboring hospital where she underwent the operation of vaginal hysterectomy less than a year before she came to my notice. I found complete inversion of the vagina, and am able to submit for your inspection two rather poor photographs showing the condition.

She was operated upon from above in the same manner as the case above described, excepting that I denuded the mucous membrane of the vagina at its fundus, before transfixing it with the ligaments, and I also purposely omitted the operation of perineorrhaphy in order that I might see the result of the unaided suprapubic work. In this case the vagina was also held well and high up. There remained, however, a degree of rectocele for which I performed a perineorrhaphy before allowing her to leave the hospital. The immediate results appear to be entirely satisfactory, but it is of course rather too soon to judge of the remote effects of the operation.

Should anyone wish to perform this operation of transfixion of the vagina with the round ligaments, I would, for theoretical reasons, at least, suggest the denuding of the mucous membrane at the fundus of the vagina before transfixing it with the round ligaments, as was done in my second operation.

So much for my personal experience with inversion of the vagina and in operating therefor. Desiring to obtain at first hand, from physicians, information regarding inversion of the vagina, I addressed a circular letter to the Fellows of the American Gynecological Society, the Fellows of the American Surgical Society, and the members of the New York Obstetrical Society, who did not also hold membership in either of the two societies first mentioned, numbering in all 228.

Of those addressed 46 reported having seen one case, or cases of prolapse of the vagina. Most of the doctors, addressed, stated the exact number of cases they had seen, which made a total of 88 cases. Eight physicians did not give the exact number, but used the expressions "few" or "several." I credited every one of these with 3 cases which made a total of 21. One physician reports having seen probably one-half dozen; he was credited with 6 cases. Another used the expression "about six." I credited with 6 cases. Another had seen

20 or 30; he was credited with 20. Another had seen 2 or 3 cases; he was credited with 2. Two reported "having seen cases;" each of them were credited with 2 cases. Quite a number of cases of incomplete prolapse of the vagina were reported, none such, however, were accepted as additions to my list.

As to the existence of procidentia uteri, before the performance of hysterectomy, it was reported as having been present in 57 of the 153 cases, as probably present in 43 cases, as having been absent in 1 case, and not stated in 52 cases.

In this relation it might be said that many of my correspondents asserted that, if the truth were known, they believed almost every case of complete prolapse of the vagina would show that procidentia uteri existed prior to the hysterectomy.

Through correspondence I have collected 150 cases, which, with 3 cases reported by myself, give a total of 153 cases of complete prolapse of the vagina, or what I term inversion of the vagina. In 63 cases inversion of the vagina followed vaginal hysterectomy; in 30 cases it followed suprapubic hysterectomy; 26 other cases were reported as having mostly occurred after vaginal hysterectomy. In the report of 37 cases my correspondents did not state whether inversion of the vagina followed the suprapubic or infrapubic hysterectomy.

As will be seen by the following, a great variety of operative procedures have been resorted to by my correspondents for the cure of this condition. Five operators reported altogether 11 operations by colpocleisis. All of these cases were cured of the inversion, with, of course, loss of the vagina. Two physicians reported 6 cases as having been operated upon by "plastic work in the vagina." As to the results, 3 of these are marked as "not having been satisfactory," in the 3 remaining ones the results were "not as good as hoped for."

Three physicians reported 4 cases operated upon after the technique of Dr. Le Fort. The results of these 4 cases were

marked as follows: 1, "successful;" 2, "cured of the prolapse, but with a loss of the physiology;" 1, result not stated. One case is marked as "having been operated upon by anterior and posterior colporrhaphy;" result not stated. Four physicians reported 6 cases as "having been operated upon by anterior and posterior colporrhaphy," presumably the operation of Le Fort, with the following results: 1, "failure;" 1, "cured;" 3, "good;" 1, "some prolapse followed."

For 1 case operated upon by exaggerated perineorrhaphy the expression "perfect result" is used to denote the end-effect. Two are marked as having been subjected to Edebohls' operation, result "successful." One operator reports 2 cases operated upon by "extensive perineorrhaphy," results "good."

Two physicians report 3 cases as having been operated upon by "suturing the lateral ligaments in vault of the vagina, and anterior and posterior colporrhaphy with exaggerated perineorrhaphy," results: 2 "good," the other 1 as "well." One physician reports 2 cases as having been operated upon by "Freund's wire suturing," result, "no lasting benefit." One correspondent reports having operated upon 2 cases "by suprapubic ventrofixation of bladder, followed with anterior and posterior colporrhaphy," results, "satisfactory." One physician reports 2 cases operated upon by "suprapubic section, and suturing the vagina to the parietal perineum; results not stated."

Two other operators report operation by "suprapubic section—suturing the broad, and sacro-uterine, and round ligaments to the upper end of the vagina, or to the cervix if present," results: "excellent" in all cases. One operator reports having, by access through suprapubic section, obliterated the vesicorectal space; he then did "plastic operation on anterior and posterior vaginal walls." "Comfortable" is the expression employed to denote the result.

Two physicians report having operated "by suprapubic

section," and the exact work consisted "in sewing the bladder to the abdominal parietes." In 1 of these cases the result is not stated. In 3 of them the immediate results are reported as having been "good," but these 3 patients had all shortly been lost sight of.

One operator reports, "having much benefited" 3 cases by work done through suprapubic section. The exact nature of his work is not explained. He was very ill when he wrote me and probably not able to write more fully.

Where hysterectomy is done, with a previous history of a complaint of uterine prolapse, many operators in later years have adopted the practice of sewing the round and broad ligaments firmly at the cervical stump, or at the top of the vagina. To this some have attributed the fact that inversion of the vagina did not succeed the procidentia uteri and the hysterectomy. A most lamentable list of cases may be formed, from the information supplied by my correspondents, of cases in which there was not claimed to be any pathology in the uterus itself, or its adnexa, but in which an hysterectomy had been done for a cure of symptoms occasioned by the prolapsed uterus.

A very large number of cases of inversion of the vagina, with prolapse of more or less of the bladder and rectum, was the common result of hysterectomy performed for the cure of prolapse of the uterus.

With a view of preventing this prolapsus, several operators tried to anchor the ligaments at the upper end of the vagina, after removal of the uterus by infrapubic section, resulting in a few successes, and many failures. I received notice of a clinic from one of the members of this Society at just the time I was issuing my circular letter, and I noticed that one of the operations marked on his hospital card was "vaginal hysterectomy, for cure of uterine prolapse." This member is undoubtedly a particularly successful infrapubic hysterectomist, and he has also done a great variety of operations from below,

which most men do from above, and it is not impossible, that with what I assume to be his very excellent technique, he may have been successful in that particular operation in preventing inversion of the vagina, and he may also have so succeeded in other cases. If so, he is far more skilful in that relation than the most of my correspondents.

It is possible that in this collection of 153 cases of inversion of the vagina, some of the patients may have been seen by two or more of my correspondents. This might happen, particularly in large cities. In New York one correspondent reports 18 cases, without a single operation. Such cases would naturally consult someone else, and, for aught I know, some of them may have been reported to me by other operators.

The following is the only information I received from my correspondents regarding non-operative treatment. In one case the vagina is kept from inverting by constantly wearing an egg-shaped pessary. Another correspondent reports a patient "kept comfortable" by wearing a mechanical contrivance; one other correspondent reports "the vagina kept up by wearing an inflated large, rubber ring."

CONCLUSIONS.

Inversion of the vagina will succeed procidentia uteri, in a considerable proportion of all cases in which there is a history of the uterus having come out of the body before the hysterectomy, unless while removing the uterus the stumps of the uterine ligaments are securely fastened in the fundus of the vagina or to the remaining uterine neck.

Anchorage of the uterine ligaments to the fundus of the vagina, or to the cervical stump, is a very easy matter as a part of the operation of suprapubic hysterectomy in the hands of experienced operators.

It is probably a less easy, if possible, task to effectually anchor the uterine ligaments to the vagina in infrapubic hysterectomy. This opinion is, of course, based upon numerous failures reported by my correspondents.

In removing the uterus for any purpose, by the suprapubic route, the stumps of the uterine ligaments should be drawn taut and well anchored to the stump. Anyone who is not reasonably certain of his capability to properly secure the stumps of the uterine ligaments to the uppermost part of the vagina, as a part of vaginal hysterectomy, should, in no instance, attempt to remove the uterus by the vaginal route for the cure of procidentia uteri, for the reason that the ultimate effects of a considerable proportion of all such cases will be failures, for the reason that inversion of the vagina will simply supplement the procidentia uteri.

Colpocleisis is doubtless the most effectual method of overcoming inversion of the vagina, but the consequent loss of physiology constitutes an item of very grave importance.

The cure, or the degree of help obtained from the so-called colporrhaphies, including the operation of Le Fort, would appear to depend, to a very considerable degree, upon the extent of the area of mucosa removed.

From the correspondence in my hands, I have formed the opinion that the greater the amount of mucous membrane removed, the better has appeared to be the results so far as the cure of the inversion was concerned, but so much tissue was removed in certain instances that, although the inversion was cured, the physiology of the vagina was lost.

The results obtained by a number of my correspondents, from operations in which the most essential element was a fixation of the bladder to the abdominal wall, indicate that just that procedure is of great benefit to these cases.

Particular attention is directed to the good results obtained by two of my correspondents from suturing the sacro-uterine and round ligaments to the fundus of the vagina.

As to the comparative merits of this operation and my own, in which an equal number of cases are reported with apparently equal results, I have little to say other than that the threading of the round ligaments through the lumen of the vagina, and the preparation of the field, and sewing it, as described in my operation, strike me as possessing all the merits of the other operation, and possibly some additional advantages. For example, after the ligaments have been threaded through the lumen of the vagina, in opposite directions, and are each seized with forceps and drawn taut, one appreciates the particular value of having the fundus of the vagina constitute a sort of pulley under which the two tension cords may be drawn; the further they are drawn through, the higher do they lift the vagina. When thus drawn taut to the desired extent, they are simply held in the grasp of forceps until the requisite sewing of catgut is accomplished.

I wish to take this opportunity of again thanking the following physicians, all of whom have contributed cases, many of them reports of operations, suggestions, and other aid in collecting material for this paper.

T. A. Ashley, Baltimore, Maryland; Hermann J. Boldt, New York City; J. F. Binnie, Kansas City, Missouri; Dougal Bissell, New York City; Joseph Brettauer, New York City; S. M. Brickner, New York City; Abram Brothers, New York City; Henry C. Coe, New York City; J. Wesley Bovée, Washington, D. C.; C. G. Child, New York City; E. B. Cragin, New York City; B. Farquhar Curtis, New York City; John B. Deaver, Philadelphia, Pennsylvania; George M. Edebohls, New York City; Willis E. Ford, Utica, New York; Francis Foerster, New York City; Henry D. Fry, Washington, D. C.; Seth C. Gordon, Portland, Maine; Egbert H. Grandin, New York City; M. L. Harris, Chicago, Illinois; Clarence R. Hyde, Brooklyn, New York; Barton Cooke Hirst, Philadelphia, Pennsylvania; A. M. Jacobus, New

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DISCUSSION.

Dr. I. S. Stone.—Mr. President: I think that Dr. Harris deserves a great deal of credit for hunting up this subject and including all abandoned cases. I have no doubt he has found as yet only a fraction of those that have been operated on. I do not know of anything that is more discouraging than to find all the connective tissue and fascial supports gone, such as we find in these cases. Emmet's idea of the importance of the fascia is correct, and we have beyond question to do something like Dr. Harris has suggested. I am sorry we have not the time to give this paper the thorough and free discusion that it deserves, owing to the lateness of the hour and the desire for adjournment.

CYSTIC LYMPHANGIOMA OF THE GASTRO-COLIC OMENTUM.

By W. Francis B. Wakefield, M.B., M.D.C.M.,
San Francisco, Cal.

If one is to judge by the sparsity of the literature on the subject, the tumor here reported represents a very rare type. In fact, so far as I can find this is the first lymphangioma of the omentum that has ever been recorded. Weichselbaum has reported a cavernous lymphangioma of the mesentery, and Homans has reported a cystic lymphangiectasis, evidently in the mesentery. This latter case is worthy of further study. I am not fully convinced that the cystic cavities described did not represent newly formed lymph structures, in which case we would be dealing with a cystic lymphangioma. Whether lymphangiomas of the omentum or mesentery are really as rare as would seem is a question admitting much doubt.

The details furnished by my own case are as follows:

A four-year-old boy was brought to Dr. S. J. Hunkin, with an enormously distended abdomen. He presented no other symptoms. For at least two years the child's abdomen had been noticed to be progressively increasing in size. Laparotomy was advised, I was invited to operate, and saw the child for the first time on the operating table.

Abdominal section disclosed a multiple cystoma, larger than an adult head, which was broadly attached to the greater curvature of the stomach, spreading out over a small portion of the anterior and a greater portion of the posterior wall. Its attachment to the stomach was so firm that it could not

be separated therefrom without danger of injury to that viscus, and it was, therefore, cut away as close as possible to the stomach wall. No gross pathological change could be observed in the wall of the stomach, the cystoma having simply plastered itself over its surface.

The leaf of the gastrocolic omentum which passes from the stomach to the transverse colon was absent, though the ordinary omental apron spread itself downward from the transverse colon over the small intestines. It seemed very clear, then—after the tumor had been delivered through the abdominal incision, and I found myself able to look directly down upon the pancreas—that I was dealing with a cystic tumor originating in and displacing the upper reflection of the gastrocolic omentum, and that the tumor early in its career, as it developed between the omental folds, had, by simple contiguity, spread itself over and become attached to a somewhat broad area of stomach wall. A small, cystic mass, about the size of a hen's egg, was found loosely attached to the head of the pancreas, and a still smaller one, about the size of an English walnut, was found attached to the serous coat of the stomach, some distance from the main tumor.

Subsequent study of the specimen develops the following details:

The tumor is larger than a man's head and consists of a number of various-sized, thin, and clear-walled cyst chambers. The central portion of the neoplasm is occupied by a single cavity which makes up the bulk of the cystic mass. Surrounding this central cavity on all sides are numerous smaller cystoid masses ranging in size from that of an orange to that of a pea. The walls of all the cyst chambers are thin, easily ruptured, smooth, shiny, and in general appearances resemble the omentum. The component layers of the cyst walls cannot be separated. The inner walls of the cyst cavities are in many places covered by somewhat adherent, gelatinous masses, which to the feel are distinctly granular.

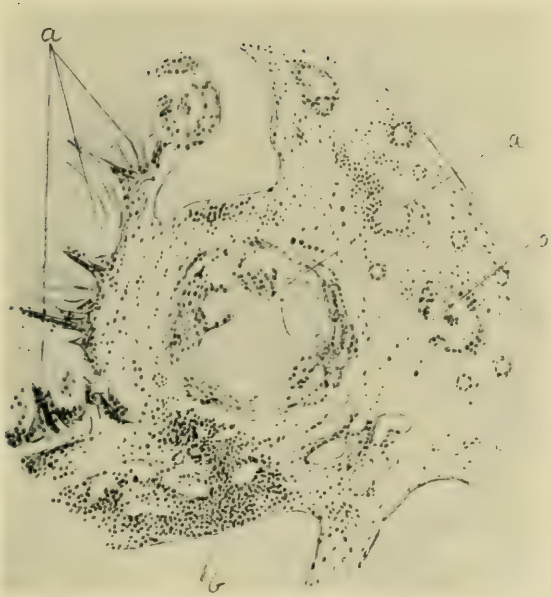

FIG. 1.—*a*. Cysts lined with giant cells and containing homogeneous pink staining material, granular near wall. *b*. Collection of small round cells. High power.

FIG. 2.—Section of cystic lymphangioma. *a*. Cyst lined with giant cells. Low power.

The fluid contained within the cavities of the cystoma is clear, straw-colored, neutral in reaction to litmus, and coagulates into a solid mass on heating with a drop of acetic acid. In some of the chambers the fluid is mixed with fine crystals, oily to the touch and microscopically identical with cholesterin. In others the presence of blood is indicated, macroscopically, by imparting a dark color to the fluid, and microscopically, by the presence of red cells. The cystic fluid everywhere contains leukocytes.

Histological examination of the walls of the cystoma show them to be made up of a large number of various-sized cavities, held together by a tissue consisting entirely of mesoblastic structures. The cavities are in part empty, in part filled with a homogeneous, pink-staining material that becomes granular in character where it approaches the walls of the cysts. The cysts show at times a lining of flat epithelial-like cells. For the most part, the wall of the cysts is made up of different sized and branching giant cells. These giant cells show, everywhere, slit-like clefts having the shape of cholesterin crystals. The supporting structure between the cysts is made up of loose connective tissue containing bloodvessels of various size, collections of small, round cells, some fat cells, and, in places, what seems to be involuntary muscle fibers. Scattered throughout the specimen are isolated polymorphonuclear leukocytes.

A consideration of the above data makes imperative a diagnosis of cystic lymphangioma, yet, as we all know, this tumor, ordinarily, would have been reported simply as a cyst, and would have received no further consideration or study. Thus, in particular, the opportunity to develop the real nature of this neoplasm would have been lost, and, in general, our knowledge of omental cystomas would be no fuller than heretofore.

It seems pertinent here to criticise the generally accepted use of the term "cyst," which, as at present employed in our literature, has ceased to convey any impression other than

merely a tumor containing fluid. Consequently we lose all the significance of tumors which result from tissue proliferation, and place them in the same class with those which are caused by retention or softening. Obviously, in thus doing, we create a lot of meaningless literature, stultify our scientific conceptions, and insult modern pathology. The term *cyst* should be restricted to mean nothing more than localized accumulations of fluid, resulting from retention or softening, it being a purely secondary formation not in any sense due to tissue proliferation. The term *cystoma* should be applied to those proliferation tumors which are characterized by the formation of cystic spaces, they being true new-growths, worthy of definite recognition as pathological entities, and demanding the same histological differentiation that is accorded to the other well-recognized neoplasms.

Especial remissness is noteworthy in the general reports of on ental and mesenteric cystomas. In only one instance, so far as I can find, are we presented with enough data to enable us to draw efficient conclusions as to the probable real nature of these tumors. The rest of the literature on the subject is simply of numerical value. I am strongly of the opinion that a large proportion, perhaps all, of these cystomas were, in fact, cystic lymphangiomas. In substantiation of this opinion I offer three considerations: First, a general belief in the lymphatic origin of omental and mesenteric cystomas is consistent with what might be expected of tumors proliferating from structures possessing the anatomical and histological characteristics and physiological function of these tissues. Secondly, it is more rational to presuppose the development of new lymph structures from an angioblastic matrix, than to assume an aberration of cells from the primordial ovules of the Wolfian bodies. Thirdly, a critical study of the reported cases shows that, with few exceptions, there is nothing to contra-indicate the possibility of their having been lymphangiomas, while the only case reported with histological detail was evidently a lymphangioma, though not recognized as such.

The case to which I have just referred was a cystoma of the omentum operated upon by Spencer Wells, and, subsequently, examined and reported by Ransom. In the gross, it contained three cystic chambers, the largest of which held a quart of fluid. Wells mentions having seen at operation a number of small cyst-like collections resembling grapes. A section of the cyst wall shows very much the same characteristics as are present in my own case. Ransom refused to make a positive diagnosis; I take the liberty of making it for him from his very excellent report, which was accompanied by a drawing illustrating a section of the cyst wall. In reviewing the histological evidence and drawing conclusions therefrom, Ransom pays no attention to the numerous dilated lymph spaces which his sketch shows, and which are really the most important feature.

This brief monograph will fulfil its object if it blazes the trail for more detail in the report of future cystic tumors of the omentum and mesentery. Then, when a considerable number will have been thus reported, we shall be able to draw some logical conclusions therefrom concerning the true character of these neoplasms.

I wish to acknowledge my indebtedness to Dr. Martin H. Fischer, Professor of Pathology in the Oakland College of Medicine, for the very material assistance he rendered me in working up the pathological detail embodied in this report.

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FURTHER EXPERIENCES WITH SCOPOLAMINE-MORPHINE ANESTHESIA IN OBSTETRICS.

By Franklin S. Newell, M.D.,
Boston.

In a recent paper I reported 41 cases in which scopolamine-morphine anesthesia had been employed in labor and drew the following conclusions:

1. Definite results are to be expected from the use of scopolamine-morphine anesthesia in the majority of cases, although its action seems to be somewhat uneven and uncertain.

2. Patients who are not susceptible to its effects do not seem to show any serious after-effects.

3. The frequency of operative deliveries does not seem to be increased by its use.

4. The uterus must be more carefully guarded after delivery to prevent hemorrhage than when the drug is not used, as the increased relaxation of the uterus, following its use, must theoretically lead to the increased danger of hemorrhage.

5. Further experience with the drug is desirable before definite conclusions can be reached.

Further experience with scopolamine-morphine in labor has resulted in a modification of some of the conclusions drawn at the time of the last report, which were based on too small a number of cases to give any great weight to the observations, and in strengthening other conclusions which seemed probable, but needed further authority before they could be accepted as definitely proved.

Our experience in the series of cases, 123 in number, which forms the basis of this paper, and which have been observed in private practice, and at the Boston Lying-in Hospital under the direct supervision of the house staff, seems to show that certain definite results can be counted on when the proper preparation and method of administration of the drug are carefully carried out. In the 41 cases reported in the original paper the results were somewhat uneven, some patients showing a marked reaction to the use of the scopolamine, while in other patients the drug apparently had little or no effect. At that time there seemed to be considerable doubt as to the susceptibility of various patients to the drug, and this was thought to account for the uncertainty of the results obtained. In considering the results obtained in the later cases, it seems fair to conclude that the instability of the drug, when in solution, was responsible for much of the apparent uncertainty of its action, rather than that the susceptibility of the patients varied to the extent which seemed to be shown by the results obtained. We have no records to show in which of the original cases a fresh solution was employed, and in which one an old solution was used, and, therefore, the question of when deterioration of the solution occurs cannot be ascertained, but in the light of our more recent experience, as reported in this paper, it seems fair to assume that some definite change does take place in scopolamine in solution, whether due to the action of light or some other unknown cause.

In the first series a stock solution of scopolamine-morphine was made and it was used as long as it lasted, while in the present series the following routine was carried out: A solution containing $\frac{1}{100}$ grain of Merck's scopolamine hydrobromide, and $2\frac{1}{2}$ grains of sulphate of morphine, was prepared at least every fourth day—oftener if a sufficient number of patients were treated to render it necessary. This solution was used in the following way: As soon as labor became active, prac-

tically when contractions occurred at five-minute intervals, an initial dose containing $\frac{1}{150}$ grain of scopolamine and $\frac{1}{6}$ grain of morphine was given hypodermically. This was repeated at the end of from one to two hours, unless the patient showed marked reaction to the initial dose. In case marked reaction developed the dose was not repeated until the effects of the drug began to disappear. In no case was the dose repeated after the cervix became two-thirds dilated, it being considered best to avoid the possibility of allowing the action of the drug to continue after delivery had taken place.

The effect of the drug was definite, the majority of the patients being dull and drowsy, or sleeping in the intervals between pains, and the following conclusions seem to be definitely proved:

1. The great majority of the patients reacted markedly to the dose described, practically the only failures being in patients where an old solution, seven to eight days old, was used to test its value.

2. The pain of labor was markedly reduced, in some cases so much so that the labor was called painless by the patient.

3. The recollection of pain endured was almost abolished.

4. Labor seems to have been definitely shortened, as well as made easier.

5. The necessity for operative interference has been distinctly reduced in this series of cases, as compared with the average number of operative deliveries in a similar number of patients not so treated.

6. No tendency to hemorrhage has been noted in any of our cases, and only rarely has undue relaxation of the uterus been observed.

7. No bad effects of any sort have been noted, whether on the heart, respiration, or pulse.

In other words, we have a distinctly favorable effect in the great majority of cases on whom the drug has been employed, and no bad effects noted.

1. Of the patients who received one or more doses of scopolamine-morphine, 112 out of 123 reacted favorably to the drug, and, since in 4 of those who showed no reaction an old solution had been used, to test its efficiency, it seems fair to assume that the effect of the drug can be definitely counted on except in occasional patients.

2. Of the 123 cases where the effect of the anesthetic on the pain suffered during labor was carefully charted, we find that 17 patients stated that labor was practically painless; 70 suffered only slight discomfort; 19 dozed during the intervals, but complained of pain, although not excessively, when the uterine contractions occurred, and may well be included under the patients who experienced marked relief. Six patients apparently experienced no relief from the pain, but slept during the intervals between contractions; 11 of the patients showed no effect. In other words in 112 out of 123 patients, labor was made distinctly easier by the use of the drug, and in 4 of the failures an old solution was employed.

3. In those patients who reacted markedly to the drug, there was, of course, no marked recollection of pain suffered, as the perception of pain was practically abolished. In those patients in whom the pain was complained of during labor, recollection of the pain suffered was more or less clouded, except among those on whom the drug was reported as having no effect.

4. Labor seems to have been definitely shortened in the majority of cases. Since, however, we have no means, except the patient's statement, of knowing when labor really began it is impossible to tell how much effect on the length of labor there really was. In 71 primiparæ the average length of labor was fifteen hours, but, since no patients are admitted to the hospital until labor is actually in progress, the true length of active labor cannot be ascertained and the real effect in shortening labor can best be surmised from what happened after the patient's entrance to the hospital. Of 51 primiparous

patients, where dilatation of the cervix at entrance to the hospital varied from a tip to two inches dilatation, in 20 cases the baby was born, and in 10 other cases the cervix was fully dilated four hours after entrance to the hospital, which would seem to show that scopolamine-morphine has a marked effect on hastening the dilatation of the cervix.

5. Operative interference was necessary in 14 cases, 4 patients being operated on for obstetrical complications, 1 eclampsia, 1 prolapsed cord, 1 high arrest of a breech with contracted pelvis, and 1 high forceps. In the remaining 119 cases, a low-forceps operation was performed ten times, which is a lower percentage than that at which we ordinarily consider operative interference advisable. This would point to the fact that the pain of the first stage of labor was such that the strain of the expulsive pains was endured with less effort than in the ordinary patient, and that not being exhausted by the pain of the first stage of labor, the patients were able to help themselves more efficiently in the final stages.

6. In none of the patients in this series was any tendency to postpartum hemorrhage to be noted, and, rather than an increased amount of blood being lost after delivery, there has been less than the ordinary amount of blood lost; and, further, the uterus has acted satisfactorily in all cases, no tendency to undue relaxation being reported in any case.

7. No unfavorable symptoms have happened in any case, the pulse rate, heart action, and respiration have apparently been unaffected by the treatment. The vomiting which was noted in one or two of the cases of the first series has been absolutely absent in this.

To sum up, 90 per cent. of the patients treated have reacted well to the anesthetic, and in no case were bad results noted.

There is one interesting fact in regard to scopolamine which deserves consideration because of the general impression that scopolamine and hyoscine are identical. This may be true from a chemical standpoint, but the effects of the two drugs

are distinctly different. Before the present series was undertaken a series of cases was observed in which hyoscine hydrobromide and morphine were employed in the same dosage as the scopolamine and morphine, but with entirely different results. The effect of the morphine, in quieting pain and making labor more comfortable, was evident in both series but the hyoscine apparently had no action in relaxing the uterus, and the labors though less painful than labors where no narcotic is used were apparently affected in no other way. Although hyoscine and scopolamine are supposed to be identical they are derived from different plants and it is admitted that another alkaloid, atroscine, occurs with the scopolamine in varying quantities; it may be that the difference of effect between the two drugs is dependent on this, and that chemically pure scopolamine would have no more effect on labor, than hyoscine apparently has.

Since this series of cases was undertaken a much more extensive series, 1000 cases in number, has been reported by Gauss. He gives certain definite precautions to be followed in the administration of scopolamine-morphine and claims that if the routine is rigidly followed no bad results will be seen.

1. That the drug must not be given until labor pains of a certain frequency and strength are present. (In our series we only employed the drug when pains were occurring at five-minute intervals or oftener.)

2. When the pains are irregular and feeble the drug should be considered as contra-indicated.

3. The dosage, in his opinion, can be definitely gauged by the patient's power of perception and memory of what was going on about her, and he tests this from time to time by questioning the patient.

The results are reported as follows:

The mortality among children has been lowered 3 per cent. since the method has been adopted. There have been prac-

tically no bad effects noted and bleeding after delivery has been markedly reduced over what is considered normal, and in no cases has there been excessive bleeding. The only disadvantage which he can see at present in this method of anesthesia in labor is that the patient requires careful watching and attention, not so much for the reason that any unfortunate effects have been noted, as that with any new method no loophole for danger should be left.

Of course it must be admitted that in patients physically weakened and unfit the method may be of some danger, and apparently most of the bad results that have been reported have occurred in patients of that class; but from the results which I have personally observed, and which have been observed by my house officers, of the effect of scopolamine-morphine anesthesia, I am convinced that we have an efficient means of controlling the pain of labor which is practically safe when ordinary precaution is taken in its use.

OPHTHALMIA OF THE NEWLY BORN.

By J. Clifton Edgar, M.D.,
New York.

The most important of the causes of blindness with which we have to do is that resulting from an infection of the eyes of the child at birth. Important, first, because it is the most common cause of blindness; second, because it affects the young child and a long lifetime of blindness may follow; and, third, because it is preventable and curable in practically every case receiving proper care, and one of the most dangerous maladies to vision when treatment is neglected or delayed.

It is a veritable world plague. It occurs everywhere and no country has yet succeeded in getting it under control. So widespread is blindness resulting from it that Magnus, who has made careful statistical studies concerning it, says that out of 2528 cases of all ages of complete blindness in Germany 10.88 per cent. were due to this cause.

In institutions the proportion is much larger. A committee of the Ophthalmological Society of the United Kingdom in 1884 estimated that about 30 per cent. of the persons concerned have lost their sight through the ophthalmia of the newborn, while in Mexico ophthalmia neonatorum is said by Ramos to be the common cause of blindness and 4500, or 30 per cent. of the whole number, are blind as a result of this preventable disease.

In the New York State School for the Blind 39 of 149 pupils have lost their eyes from ophthalmia neonatorum, which is a rather smaller proportion than that found in institutions

elsewhere. In the State of New York more than 600 now hopelessly blind from this cause might have been spared this dreadful calamity had simple prophylactic measures been employed at the day of their birth, while in the United States are between six to seven thousand people who have been blinded by this disease.

For four years preceding 1906 the annual proportion of new pupils entering New York State School for the Blind who had lost their sight from ophthalmia neonatorum was a quarter of the whole number admitted. While of the class of 1905, in which there were more young children owing to the effects of your Commission to find them, over 26 per cent. of the whole had become blind, not one of whom needed to have lost his sight had simple prophylactic measures been employed.

This is a disease dependent upon an infection finding an entrance in the eyes of the child at or immediately after birth. Stephenson has shown that about two-thirds of all cases of ophthalmia in newly born babies are due to the micrococcus of gonorrhea.[1] If the eyes are carefully cleansed at once so that the infected secretion does not get within the lids, or if the germs be washed out with a simple solution before they have time to multiply, or if the virility of the microbes be destroyed by a solution which is in itself harmless in its effect on the eyes, the disease will not develop. But as one can never be sure that in inexpert hands the washing is complete and thorough, and as it is not easily performed, the latter method in every suspected case at least should invariably form a part of the toilet of the child.

As this disease occurs in about 0.5 of 1 per cent., or 1 in 200 of all births, and as the total number of births registered for 1906 in New York was 183,012, the frightful prevalence of the disease can be readily estimated.

[1] Ophthalmia Neonatorum, its Etiology and Prevention. Transactions of the Obstetrical Society of London, 1905, vol. xlv.

It should be the purpose of the profession, therefore, to find and make known some agent which may be used by everyone who attends a case of labor, and to this end the American Medical Association, by means of a series of questions, sent out in circular form, has endeavored to determine the most efficient and most popular method.

As a member of the Committee on Ophthalmia Neonatorum, I sent out a large number of circulars relative to the prophylactic use of silver nitrate in these cases. The number of physicians replying was 113. Of these, 103 think that a solution of nitrate of silver is the most effective drug for the prevention of this disease, as well as the most inexpensive. In view of the fact that a 2 per cent. solution occasionally causes silver catarrh and that a 1 per cent. rarely does so, 94 thought it safer and better to select this percentage for recommendation.

In addition to these replies, a number wrote personal letters from which I shall abstract the most important points: 7 physicians prefer argyrol and protargol, in solutions of from 5 to 25 per cent.; 4 prefer boric-acid solution; 1 announced himself in favor of sterile water, and 1 other uses saline. Still another prefers boric or salt, but thinks it dangerous to teach to medical students and the general profession; 4 physicians think that the choice of method should be left to the doctor in charge of the case; 3 would make it compulsory for almshouses, hospitals, and dispensaries, but not for private cases. The 2 per cent. silver nitrate solution was preferred by 3; 1 goes on record as saying that he does not consider silver nitrate a prophylactic in all cases; another asserts that the vaginal canal always contains bacteria.

Incidentally in reply to the proposition that a law be passed in each State securing the distribution through the various State Health Boards of small, sealed, inexpensive, light-proof tubes or ampules of the selected solution to be sent gratuitously

to every physician and midwife on the passage of the law, and subsequently when required, or on filing of each birth certificate, 97 replies were in favor of such a law, 11 against it, and 5 were uncertain as to its advisability. Of the 11 opposing, 3 were not in favor of laws compelling physicians to perform an obvious duty.

In answer to the proposition that it shall be required by law that the birth certificate shall contain a statement signed by the accoucheur that some recognized procedure specified on the blank has been used in each eye of the newly born on the day of birth, as a preventive of ophthalmia neonatorum; in the absence of this statement, should ophthalmia neonatorum develop, and the child lose the sight of one or both eyes, the accoucheur, whether physician or midwife, filing the certificate, shall be deemed guilty of criminal negligence, and shall be subject to such penalty as the State may exact: 80 were in favor of such a law, 24 opposed, 5 were undecided, and 4 made no reply; 5 remarked that this was too drastic a procedure; 1 considered the proposition none too strong; 5 remarked that it would bring physicians into trouble through damage suits; 1 thought it applicable for midwives and not for physicians.

In answer to the proposition that it shall be the duty of the State health officers to place ophthalmia neonatorum on the list of communicable diseases, and failure of the attendant to report to the local Health Board each birth, the existence of ophthalmia neonatorum when present, and the fact that some prophylactic has or has not been used, shall be considered a misdemeanor, and subject the offender to such penalty as the State may exact: 91 favored such a proposition, 16 were opposed to it, 2 were undecided, and 4 did not answer this question.

In answer to the proposition that it be strongly urged, if the above program meets with general approval, that the president of each State Association be invited to appoint a

Committee on Ophthalmia Neonatorum whose duty it shall be to collaborate with the State Board of Health in securing in the several States the enactment and enforcement of laws embodying the above propositions; 97 were in favor, 9 against, and no answer was received from 7.

The conclusions from a study of these replies make it certain that silver nitrate as a 1 per cent. solution is preferred by obstetricians in the United States in a position to judge of the merits of the various measures employed.

An important objection to Credé's method is that it tends to increase eye morbidity by causing "silver catarrh." This has led to the use of argyrol and protargol. Zweifel uses the former, and neutralizes with sodium chloride. His morbidity in over 5000 cases has been but 0.23 per cent. Scipiades finds argyrol a certain prophylactic. From a number of other clinics come equally good reports as to protargol.

Not only were the results less favorable, but more silver catarrh was caused by Zweifel's method than by any other single procedure. Hence, at the Hofmeier clinic, Credé's 1 per cent. is regarded as the best prophylactic.

My faith in the prophylactic power of the nitrate of silver method is so strong that I attribute all apparent negative or ill effects of the method to the presence of antepartum infection of the eyes, to unskilled application, or to improper or inert solutions.

Does Credé's Method Cause Conjunctivitis? Neither Leopold (in 3000 cases) nor Rosthorn (in nearly 25,000 cases) ever witnessed this accident. Bischof maintains that conjunctivitis never results if the technique is correct.

In regard to treatment, Alvarado sent out a circular of inquiry to colleagues (oculists) in all parts of the world as to relative merits of Credé's method on one hand and the substitution of *protargol* on the other. He received thirty-one replies, all but one in favor of Credé's. The exception was the Lyons clinic, where protargol is in use.

Ernst discusses Credé's method very briefly with reference to the conjunctivitis which it is said to cause. No gonococci are ever found in these cases. They are due, therefore, to the nitrate. He experimented with a 1.5 per cent. solution and still got the conjunctivitis. Finally, he found that the 1 per cent. solutions were non-irritant. At the Cologne Maternity, from January 1, 1902, to July 1, 1904, Ernst employed the 1 per cent. solution in 1111 births. Not a single case of ophthalmia developed.

The work detailed in this paper was performed for the purpose of determining, if possible, what strength of silver nitrate solution might be safely entrusted to the hands of students and midwives for the purpose of instilling into the eyes of the newly born in order to prevent ophthalmia neonatorum.

In considering this matter, the following characteristics were thought to be essential to the proper solution:

1. The solution must be one which will be germicidal to the gonococcus.

2. The technique of its application must be simple so that, in the hands of the most careless or inexperienced student or midwife, no harm can be done.

3. The solution must be of such strength that, while it will prevent ophthalmia neonatorum, it will not cause silver catarrh.

4. The solution must be stored in such a receptacle as to (*a*) preserve its strength and (*b*) permit of its being placed in the eyes of the newly born without possibility of mechanical injury.

1. *The Solution must be One which will be Germicidal to the Gonococcus.* The work of testing the germicidal effect of various strengths of silver solutions on the gonococcus was undertaken by Prof. James Ewing, of Cornell Medical College. He assigned the task to Dr. John C. Torrey, one of his staff, the work being done in the Loomis Laboratory. Our

thanks are expressed to both Doctors Ewing and Torrey for the complete report which here follows:

Test of germicidal effect of 0.5 per cent., 1 per cent., and 2 per cent. of silver nitrate on gonococcus.

Culture of gonococcus on ascitic agar twenty-four hours old was used in the tests.

I. 3 drops of this growth was emulsified in 5 drops of sterile distilled water. To this was added 6 c.c. of 0.5 per cent. silver nitrate (solution distinctly clouded thereby); 1 large drop of this was transferred to 15 c.c. ascitic broth tubes at the following intervals:

	Result, twenty-four hours.	
1. Fifteen seconds	No growth.	Negative.
2. Thirty seconds	"	"
3. Forty-five seconds	"	"
4. One minute	"	"

II. Same operation with 1 per cent. silver nitrate:

5. Fifteen seconds	No growth.	Negative.
6. Thirty seconds	"	"
7. Forty-five seconds	"	"
8. One minute	"	"

III. Same with 2 per cent. silver nitrate:

9. Fifteen seconds	No growth.	Negative.
10. Thirty seconds	"	"
11. Forty-five seconds	"	"
12. One minute	"	"

Control. Distilled H_2O (sterile) used in place of nitrate solution.

13. Fifteen seconds	Growth.	Positive.
14. One minute	"	"

From these experiments it would appear that silver nitrate in 0.5 per cent. strength or stronger is quickly germicidal to the gonococcus.

2. *The Technique of its Application Must be Simple, so that in the Hands of the Most Careless or Inexperienced Student or*

Midwife No Harm Can be Done. So far as I could learn from careful inquiry at a number of maternity hospitals, the general technique was to drop into the eye several drops of some silver preparation from a glass medicine dropper, and shortly thereafter to cleanse the eye with a second solution, such as plain sterile distilled water, boric acid solutions of varying strengths, or normal saline solution, but nowhere could I find that a silver nitrate solution was used without immediately applying some other solution to neutralize or wash away the silver salt.

It would seem that it would be a dangerous practice to require the use of a preparation that necessitated after-neutralization, for, in the various exigencies of the lying-in room such after-neutralization or cleansing might be neglected or improperly performed and the eyes of a large number not infected with the gonococcus might be injured by the production of a silver catarrh. Therefore, if a solution which did not require after-neutralization could be supplied, a very simple procedure could be inaugurated thus: First, wipe the eyelids with a clean piece of gauze or cloth not previously used in the lying-in room. Second, drop into the eye the contents of the receptacle containing the solution. This technique would be simple and, with proper receptacles containing just enough for one eye, would be perfectly safe. Furthermore, if it could be shown that some certain solution could be used with equally good results, whether neutralized or not, it would be the ideal solution. Then in case neutralization was neglected the eye would still be protected from infection and no silver catarrh set up. Such a result seems to be found in the use of a solution of 1 per cent. silver nitrate, as is shown in the observation here recorded.

3. *The Solution Must be of Such a Strength that while it will Prevent Ophthalmia Neonatorum, it will Not Cause Silver Catarrh.* It was for the purpose of trying to find some solution which might be used without after-neutralization that

would prevent ophthalmia neonatorum and at the same time produce no silver catarrh that the following observations were made:

The cases observed were in the wards of the Manhattan Maternity Hospital and the Bellevue Emergency Hospital.

The patients were from the average east-side tenement-house district, some with histories of previous vaginal discharge, some with vaginal discharge on admission, and some with neither history nor sign of vaginal discharge.

The technique used in the eyes of the newly born from these patients was as simple as could be performed. In some cases as soon as the head was delivered, in others after the delivery was completed, with a clean piece of gauze the mucus was wiped from the eye and by means of a medicine dropper 1 to 3 drops of the solution were dropped into each eye. This method was followed out with solutions of silver nitrate of one-half of 1 per cent., 1 per cent., and 2 per cent., with the following results:

Solution.	Subsequent neutralization.	Number of children. Result.	Hospital.
Silver nitrate 1 per cent.	Boric acid solution.	1000. 25 cases of mild silver catarrh. Longest reaction, 5 days. No ophthalmia.	Bellevue.
Silver nitrate 2 per cent.	Nominal saline solution.	20. 5 cases of silver catarrh. Duration, 2 to 3 days. No ophthalmia.	Manhattan Maternity.
Silver nitrate 0.5 per cent.	No cleansing of eyes afterward.	35. No cases of silver catarrh. 1 purulent ophthalmia developed on the ninth day. Treated argyrol, 35%.	Manhattan Maternity.
Silver nitrate 1 per cent.	No cleansing of eyes afterward.	20. 1 case of silver catarrh. Duration, 2 days.	Manhattan Maternity.
Silver nitrate 2 per cent.	No cleansing of eyes afterward.	20. 6 cases of silver catarrh which yielded to boric acid solution in 2 to 3 days. No purulent ophthalmia	Manhattan Maternity.

1000 cases were treated at the Bellevue Emergency Hospital with a 1 per cent. solution of nitrate of silver, and this was immediately thereafter neutralized with a boric acid solution.

There were no instances of ophthalmia neonatorum in this series. 25 cases, or 2½ per cent., showed symptoms of mild silver catarrh, the longest duration of which was five days. 20 cases were treated at the Manhattan Maternity with a 2 per cent. solution of silver nitrate, and afterward neutralized with normal saline solution. Of these 5, or 25 per cent., developed silver catarrh lasting from two to three days. No cases of ophthalmia neonatorum. 35 cases treated at the Manhattan Maternity with a 0.5 per cent. of nitrate of silver, with no after-cleansing of the eyes. No cases of silver catarrh resulted. 1 case of purulent ophthalmia developed on the ninth day, which was cured with 25 per cent. argyrol solution. 20 cases were treated at the Manhattan Maternity with a 1 per cent. solution of silver nitrate, with no after-cleansing of the eyes. 1 case, or 5 per cent., developed a silver catarrh lasting two days. No ophthalmia. 20 cases were treated at the Manhattan Maternity with a 2 per cent. solution of nitrate of silver without after-neutralization. 6 cases, or 30 per cent., developed silver catarrh, which yielded to treatment in two or three days. No purulent ophthalmia.

Of those cases in which one-half of 1 per cent. of silver nitrate was used, the eyes of 97 per cent. were perfectly normal after ten days, with no discharge up to that time. A number of these were from mothers who had a purulent vaginal discharge on entering the hospital. The other 3 per cent. got up a purulent discharge about the ninth day, and were then treated with argyrol and cold applications.

Of those cases in which 1 per cent. silver nitrate solution was used without after-neutralization, none of them had an after-discharge with the exception of a blonde baby, which type of child appears to be more susceptible to the action of the silver salts than dark babies; at least, this is the experience of the last seven years in the Emergency Hospital.

In those cases in which 2 per cent. silver nitrate solution

was used the result was not so satisfactory. In the few cases tried a large percentage showed signs of severe irritation when the solution was not followed by boric acid solution.

The method which has most commended itself to the writer is the one now in use at the Emergency Hospital. It involves but one additional step in the technique, namely, that of following the installation of several drops of 1 per cent. silver nitrate in each eye, by a weak solution of boric acid. This method has been efficacious in several hundred cases, many of the mothers having been previously infected with the gonococcus. From the fact that a 1 per cent. solution may be used without after-neutralization, it would be perfectly safe to require the use of a 1 per cent. solution of silver nitrate, with after-cleansing by boric acid, and in the event of carelessness or negligence, even if the boric acid solution was not applied, there would no harm come to the eyes of the child.

4. *The Solution Must be Stored in such a Receptacle as to* (a) *Preserve its Strength,* (b) *Permit of its being Used without Possibility of Mechanical Injury.* Ampoules, light-proof and hermetically sealed, as suggested by F. Park Lewis, M.D., in an article in the *Journal of the American Medical Association,* April 28, 1906, is something on the order desired.

CONCLUSIONS.

1. That silver nitrate solution of 0.5 per cent. strength, when applied to the gonococcus for fifteen seconds or longer, is germicidal to that organism. Therefore, any solution of equal strength or stronger would fill the requirements so far as germicidal power is concerned.

2. That the technique of administration consists simply of instilling the solution into the eye, requiring no after-neutralization.

3. That solutions of silver nitrate of 0.5 per cent. and 1 per

cent. strength did not produce a silver catarrh, even though no neutralizing solution was used afterward. That solution of 2 per cent. silver nitrate produced a silver catarrh in about 25 per cent. of cases, whether or not a neutralizing solution was used. Therefore, 1 per cent. solution being germicidal and at the same time producing no silver catarrh, is recommended.

4. That some convenient receptacle should be used.

I wish to express any indebtedness to Dr. Raymond Hoobler, of the Cornell Medical College, for much valuable assistance in the preparation of this paper.

A STUDY OF THE UTEROSACRAL LIGAMENTS.

By I. S. Stone, M.D.,
Washington, D. C.

We have made careful examinations of most of our gynecological patients during the past year with the intention of ascertaining the availability of the uterosacral ligaments for suspensory purposes. With the patient in the high pelvis position, and the abdomen open in the median line, we have observed the length of the various ligaments, the mobility of the pelvic peritoneum, and what differences existed between these structures in nulliparæ and similar ones in multiparæ. These observations are intended to supplement those previously made by the early gynecologists, who believed that the lacerations resulting from childbirth were the principal factor in the production of retroversion and prolapse of the uterus.

A number of eminent names could be mentioned among those who ignored conditions above the vagina or pelvic floor. They taught us to prevent lacerations if possible; but if these accidents occurred they must be repaired, which repair, if properly done, would prevent all further trouble. This meant that a repair of the fascia near the vagina, or that which could be reached from the vagina, was amply sufficient. Looking backward over the vast number of useless attempts made by well-meaning operators to improve upon the teaching of our immediate predecessors, we can the better appreciate the elements of truth contained in the philosophy

of uterine prolapse, as taught by them. A few men are now looking at uterine displacements as a feature of, or a result of, some other disability. We confess that we are of that number, for we know that many, perhaps most of the women with retroversion, whether nulliparæ or multiparæ, have enteroptosis, with elongation of the retro-uterine peritoneum, including the uterosacral ligaments. Therefore, we are at present inclined more than ever to acknowledge the precepts of our early teachers, but we now add to their theory that of the relation of visceral descent, or enteroptosis, as a factor in the production of uterine displacements.

Our study of the subject, during the past few years, has convinced us that many of our ordinary cases of "version" have their origin in a prolapse of the mesentery. With this prolapse or elongation, we have stretching of the fascia and connective-tissue supports throughout the pelvis. We certainly have great elongation of the round and broad ligaments and also the uterosacral ligaments. This is easily demonstrated in young women who are not married, and who have not conceived or borne children as well as in multiparæ. It is apparently true that women with retroversion, who bear children and sustain lacerations during childbirth, fall easily into invalidism from prolapse, without some form of treatment. This, however, fails to negative our statement that the presence of a retroversion of the uterus in either multiparæ or nulliparæ, is evidence that the retro-uterine suspensory-peritoneal supports are defective. Therefore, we feel convinced that operations upon any special ligament such as the round ligament, that will cause it to hold more than its allotted share of weight, will fail of success, for the simple reason that an extra amount of weight will be thrown upon such ligaments, and especially so when a displacement has been overcorrected.

We think all gynecologists will agree that descent of the uterus, with forward pointing of the cervix, depends upon lack

FIG. 1.—Photomicrograph of a section of a uterosacral ligament. The muscular tissue is outlined with ink. A large pinhead would cover the entire bundle of muscular fibers. The peritoneum is seen in dim outline. The greater part of the mass is composed of connective tissue. There is a considerable amount of blood clot in the specimen.

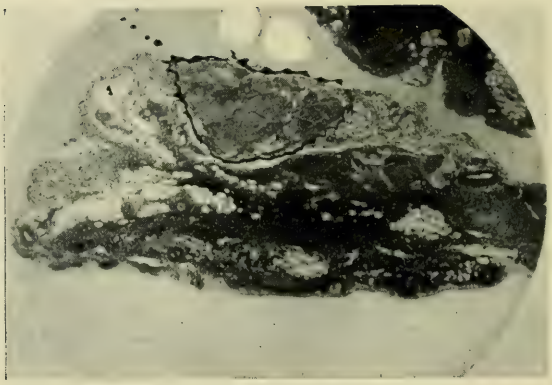

FIG. 2.—Drawing made from microscopic section of a ligament. The patient was a multipara, and had retroversion and slight prolapse. The section was about one-eighth to one-fourth inch after hardening. The muscular tissue is seen in the lower right margin. Note the number of comparatively large vessels. This section is also larger than usual, owing to the presence of blood clot, which is due to clamping the ligament before division.

of strength in the posterior-uterine supports, whatever their character may be. Those believing in the ability of the uterosacral ligaments to furnish this support, tell us that the fault lies in them. It is at least plausible to assert that the posterior supports give way first, and that the round ligaments soon become elongated as the uterus inclines backward. In correcting displacements in our practice, we have seen the temporary benefit of round-ligament shortening fail to give permanent relief, because the cervix was not held backward as it should be by the action of the ligaments in question. We have also seen the same defect in the ventral suspension operations. In these we see the cervix elevated for a time, or until the suspensory ligament is formed, but the cervix invariably comes forward toward the symphysis as freely as before the operation, especially when the patient is in the erect position.

We propose to describe the method of examination by reporting the following case of retroversion occurring in a comparatively healthy nullipara:

Gyn. Case. L. N., colored; single; nullipara; aged twenty-four years. She has not been severely ill at any time, nor has she had the venereal diseases. She has had backache, slight headache, and pain in the pelvis in the region of the left ovary. She has not lost flesh nor has she any disease of her digestive organs. She has been regular at the month, has not had much if any dysmenorrhea, and has only slight leucorrhea. Her right kidney is 6 cm. lower than normal. Her stomach is also lower than normal. Her uterus is retroverted. The cervix is pointing toward the symphysis, and the fundus is very low in the cul-de-sac of Douglas. The fundus is somewhat enlarged. There are no evidences of other uterine or annexal disease. Operation, April 4, 1907. The cervix is caught with a volsellum. The abdomen is opened in the median line. The uterus is drawn out of the abdomen, and its internal os is about as high as a horizontal line drawn

between the anterior-iliac spines. The uterosacral ligaments are now seen standing out in plain view. The uterus is now held by the fundus, and is pressed forward toward the symphysis. In the present instance its anterior surface can be made to reach about 3 cm. from the symphysis. Finally, the volsellum attached to the cervix is drawn downward until the cervix nearly reaches the introitus. With the uterus in this position the uterosacrals are not visible, being lost from view, while the entire retro-uterine peritoneum is tense, and the pelvic fold of the mesentery is also perceptibly lower than before. The broad and round ligaments are greatly elongated, and appear to share relatively in the changes mentioned above.

In this case, as in a few others, we measured the length of the round ligaments, and found them 10 cm. in length, or double the normal. As the cervix could be made to touch the symphysis, it was evident that the posterior ligamentary and peritoneal supports were inadequate as suspensories. The uterosacrals stand out with greater prominence with the uterus pressed against the symphysis, and one can clamp and excise them for further study if desired. We had the photograph made from a section of one of the ligaments in the case now under description. Nearly all of the mass shown is made up of connective tissue, with only one small bundle of fibers about 1 mm. in diameter. We took this section from a point 4 cm. from the posterior margin of the cervix. A dissection made the same distance from the sacro-iliac junction, showed nothing to the unaided eye but loose connective tissue.

After satisfying ourselves that the uterosacral ligaments were apparently useless in nulliparæ with retroversion, we made precisely similar observations upon multiparæ. A patient was selected who had borne four children, and who had a considerable degree of vaginal relaxation with retroversion and descent of the uterus. The patient was a thin, nervous woman who had the usual backache, headache, and leucorrhea, and was no longer able to attend to her duties as

housewife. This woman had never been very ill at any time, and there appeared to be very little evidence of organic disease except the changes incidental to visceral prolapse. Her stomach and right kidney were markedly lower than normal, and there was decided intestinal pressure upon the retroverted fundus and the cul-de-sac, while the patient was standing.

All of the measurements taken showed an additional degree of elongation in the various ligaments. The cervix was easily drawn outside the introitus, and the whole organ could be removed from the abdomen with less traction than in the previous case. A dissection of the urterosacrals proved the absence of a perceptible amount of muscular tissue, but the microscope shows a few bundles in the magnified drawing. (See Diagram 2.) This patient was a victim of Glénard's disease, and we confess to a feeling of helplessness when we are confronted with such a number of slight changes, any one of which is comparatively unimportant, yet in the aggregate may render our patient, if a poor woman, an invalid. Shall we begin by shortening the round and uterosacral ligaments to overcome a retroversion of her uterus, which we believe is a part of the trouble, and more a result than a cause of her poor health? Or shall we attempt treatment of the enteroptosis and the nephroptosis? These poor, thin, anemic women, who have need of rest and forced feeding and massage, cannot easily be cured by the application of a pessary, or any other method of holding the uterus in position, such as may be done, temporarily at least, by a ligament operation.

It appears to us absolutely impossible to retain the uterus in position by any method of treating the uterosacral ligaments, which would depend upon their muscular strength. It is possible that temporary benefit may be obtained by folding the ligaments upon themselves, "shortening," but when we see the whole retro-uterine peritoneum so loosely attached to the pelvis, we should not be very confident of success after the operation. Even with shortening of the

round ligaments, which draws the uterus in anteversion, we find the pressure of the viscera downward into the cul-de-sac exerted with great force, and we see no reason why the duplications of the ligaments should not unfold and the cervix descend as before.

Operations have been tried by English operators, having in view a firm attachment of the uterosacral ligaments to the pelvic brim, and we find that Jessett attempted to secure the peritoneum, with the ligament to the periosteum, at that point. His method has not become popular, and very few surgeons have tried it. Bishop has also attempted to attach the upper end of the uterosacral ligaments to the pelvis in such a manner as to provide a normal, elastic-suspensory ligament. He calls attention to the frail and attenuated muscular bands which are overstretched in uterine displacements, and which atrophy when torn or otherwise injured. (See Bishop, *Medical Press and Circular*, London, December 24, 1902, p. 675.)

NOTE.—As this paper is intended merely as a study of the ligaments, we shall avoid for the present further allusion to the practical application of our subject.

PAPERS

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URETHRAL BACTERIA AS A FACTOR IN THE ETIOLOGY OF CYSTITIS IN WOMEN.[1]

By Fred. J. Taussig, M.D.,
St. Louis.

In discussing the etiology of cystitis in women, we must distinguish three main channels of infection: one, by way of the ureters, a second, directly through the bladder wall from some of the surrounding structures, vagina, rectum, ovary, tube, uterus, and the third from below by way of the urethra. Of these three, by far the most frequent route of infection is the last named, the urethral. In general we may say the ureter acts merely as a channel to carry infectious germs such as tubercle or typhoid bacilli from the kidneys to the bladder. The ureters themselves are normally free from germs and are rarely the primary source of the infectious material. Likewise the bladder wall is seldom a primary seat of infection, but is only secondarily penetrated by suppurative processes, such as pyosalpinx, etc., or by the invasion of colon bacilli from the rectum. How does this rule apply to the third channel of infection, the urethra? Are we to consider in this case also that the germs are merely carried from the outside through the urethra into the bladder? Are we to hold responsible the germs left in the catheter by insufficient sterilization and the accidental contamination of such an instrument by the hands of the nurse or the vulva of the patient? or are we to blame in this instance the presence of pathogenic germs residing in the urethra, which, spontaneously or by means of some instrument, gain entrance into the bladder? Manifestly the solution of these questions

[1] This Thesis was inadvertently omitted from the previous volume of Transactions.—Editor.

must depend primarily on whether or not bacteria are present in the normal female urethra and whether or not these bacteria are pathogenic.

The bacteriological examinations made thus far are still rather scanty, so that confirmatory evidence on this point is greatly to be desired. With this object in view I made bacteriological examinations of the urethral secretion in fifty women free from any disease of the urinary tract or acute pelvic inflammation. In addition, various tests were made in regard to the manner of catheter infection. The results of the examinations together with the lessons to be drawn therefrom in the way of prophylaxis will be considered later.

For many centuries it has been known that under certain pathological conditions fermentation takes place in the urine deposited in the bladder. The general assumption up to the middle of the nineteenth century was that this fermentative process was purely chemical and was due to pus, mucus, various albuminous substances, and the like. In the year 1859 Pasteur shed new light upon this question. In several classical experiments he showed that the ammoniacal decomposition of the urine is due to the action of bacteria, and that these bacteria are probably carried into the bladder by means of the catheter. His views met with considerable opposition and it was almost thirty years later (1886) before the truth of his observation was corroborated. It was primarily the improvement in bacteriological technique made by Koch that enabled men like Bumm, Albarran and Halle, Michaelis, Clado, and others to isolate from the urine of cystitic patients the ordinary pus-producing microörganisms.

Cystitis having been shown to be of bacterial origin, it remained to determine next the source of these bacteria. Pasteur thought that the bacteria were derived from the air. Others had supposed that they resided in the catheter. Rovsing first called attention to the bacteria of the urethra as a possible source of infection. In his book, *Die Blasen-*

entzündungen und ihre Aetiologie, published in 1890, he reported the results of bacteriological examinations of the urethra in ten women free from any disease of the urinary tract. In six of these women he found the same bacteria (staphylococci, streptococci) that produce cystitis. Savor a few years later made similar examinations and found the colon bacilli in four out of twelve urethral secretions. He believed that this bacillus is deposited in the urethra by contact with the vulvar secretion, and that it can multiply there even under normal conditions. In 1897 appeared Melchior's excellent monograph on *Cystitis and Urininfection*. This author made extensive bacteriological investigations on matters relating to cystitis. In the urethral secretion he found staphylococci and streptococci, but not colon bacilli.

Von Gawronsky examined the urethra of 62 women and in 47 of them (76 per cent.) found no bacteria present. In the remaining 15 women he found staphylococci 9 times, streptococci 3 times, and colon bacilli twice.

In a second more extensive series of examinations, Savor found in 93 gynecological patients free from gonorrhea, an absence of bacteria in the urethra 34 times. Pathogenic bacteria were found as follows: Staphylococcus pyogenes albus, 6 times; Staphylococcus pyogenes aureus, 6 times; streptococcus, 4 times; Bacillus coli communis, 14 times. He also made a large number of examinations of the urethral secretion in pregnant and puerperal women.

Almost diametrically opposed to Savor's findings were those of Schenck and Austerlitz, who, in but 3.4 per cent. of their cases, found pathogenic bacteria in the urethra. In later investigations they modified the technique of obtaining the urethral secretion to accord with the method employed by Savor, but without appreciable change in their findings.

The bacteria of the male urethra have also been the subject of considerable research. The most recent work,

perhaps, is by Pfeiffer, in 1904, who found only 1 case sterile in a total of 24. Secretion taken by means of an endoscope showed bacteria present in the posterior as well as the anterior urethra. Staphylococci were found in 75 per cent. of the cases. Streptococci and colon bacilli were absent. None of the germs were pathogenic for animals.

Finally, we come to the work of Baisch and Piltz. Baisch found staphylococci invariably present in the urethra of 30 out-clinic patients. In two-thirds of these patients the colon bacillus was also found. In postoperative cases confined to bed he found that every urethra after the third day contained both staphylococci and colon bacilli. More careful and extensive bacteriological examinations were made soon afterward in the same clinic by Piltz. In 50 gynecological cases he found pathogenic bacteria present in the urethra 24 times; 18 times Staphylococcus pyogenes albus was found; 6 times the colon bacillus; once Streptococcus pyogenes, and once Staphylococcus pyogenes aureus. Tests were also made in twenty-five pregnant and twenty-two puerperal women as to the presence of pathogenic bacteria in the urethral and vulvar secretions. He found such bacteria present in the following percentage of cases:

Pregnant women: vulva, 68 per cent.; urethra, 32 per cent. Puerperal women: vulva, 100 per cent.; urethra, 86 per cent. as compared with Gynecological cases: vulva, 88 per cent.; urethra, 48 per cent.

It would appear, therefore, that these germs have a tendency to decrease during pregnancy and to undergo a marked increase a few days after delivery. Piltz's results differ from those of Baisch more especially in the frequency with which colon bacilli were found. Although his work was done in the same clinic he found the colon bacillus in the vulva of only 26 per cent. of the puerperal cases (women confined to bed) and in the urethra of only 5.8 per cent. of these women. Among the gynecological cases the proportion

of colon bacilli in the vulva was 70 per cent.; in the urethra it was 18 per cent.

At first glance the findings of these various investigators, as shown in Table I, seem hopelessly contradictory. Yet, if we except the work of Schenck and Austerlitz and of Baisch, the results do not seem irreconcilable. The difference can, it seems to me, be explained on one or several of the following grounds:

1. Difference in the character of the material (ambulatory patients—patients confined to bed, pregnant women, puerperal cases).

2. Difference in the preliminary preparation of the urethra.

3. Difference in the quantity of material removed for examination.

4. Difference in the character of media on which the material was grown.

5. Difference in the exactness with which individual colonies were studied before their identification was considered complete.

6. Difference in the conception of what constitutes a pathogenic bacterium.

Under head (1) the examinations of Savor together with those of Piltz would make it seem more than probable that the number of bacteria present in the normal female urethra becomes lessened in the last months of pregnancy, and that during the puerperium there is a marked increase in their number. This increase may, perhaps, be due to the fact that these persons are confined to bed. Baisch found that even perfectly healthy women, if confined to bed for several days, showed an increase in the number of pathogenic germs in the urethra. Finally, in patients with acute or chronic gonorrhea, Savor found a decided increase in the number of pathogenic urethral bacteria besides the gonococcus. It is evident, therefore, that each investigator must clearly state the character of cases from which he takes his material.

TABLE I.

Author.	Number of cases.	Sterile.	Pathogenic bacteria.	Staph. pyogenes albus.	Staph. pyogenes aureus.	Streptococcus pyogenes.	Bacterium coli.	Other pathogenic bacteria.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Rovsing	10	4 = 40.0	6 = 60.0	.....	2 = 20.0	2 = 20.0	.....	3 = 30.0
Melchoir	6	.....	3 = 50.0	3 = 50.0				
v. Gawronsky	62	47 = 76.0	14 = 22.5	1 = 1.6	8 = 12.9	3 = 4.8	2 = 3.2	
Savor	93 non-pregnant non-gonorrheal cases.	34 = 36.5	40 = 43.0	16 = 17.2	6 = 6.4	4 = 4.3	14 = 15.0	
Savor	49 non-pregnant gonorrheal cases.	6 = 12.2	38 = 77.5	19 = 38.8	5 = 10.2	2 = 4.7	6 = 12.2	5 = 21.7
Savor	120 pregnant cases (290 examinations).	72 = 24.8	198 = 68.2	142 = 48.9	7 = 2.4	22 = 7.5	25 = 8.6	2 = 0.7
Savor	88 puerperal cases (173 examinations).	10 = 5.8	149 = 86.1	95 = 54.9	4 = 2.3	16 = 9.2	37 = 71.8	1 = 0.6
Schenck and Austerlitz	60	32 = 52.0	2 = 3.3	.....	.....	.....	1 = 1.6	1 = 1.6
Schenck and Austerlitz	25 non-pregnant cases.	10 = 40.0	1 = 4.0	.....	.....	.....	.....	1 = 4.0
Schenck and Austerlitz	25 pregnant cases.	13 = 52.0						
Schenck and Austerlitz	25 puerperal cases.	13 = 52.0	2 = 8.0	.....	.....	.....	.....	2 = 8.0
Piltz	50 non-pregnant cases.	4 = 8.0	24 = 48.0	18 = 36.0	1 = 2.0	1 = 2.0	9 = 18.0	
Piltz	25 pregnant cases.	5 = 20.0	8 = 32.0	7 = 28.0	.....	.....	3 = 12.0	
Piltz	22 puerperal cases.	0 = 00.0	19 = 86.0	19 = 86.0	1 = 4.5	6 = 27.7	1 = 4.5	

The preliminary preparation of the patient is of the greatest importance. Savor and Schenck and Austerlitz used a cotton pledget soaked in 1 to 1000 bichloride solution to cleanse the meatus urinarius. The latter went even so far as to wipe the lower portion of the urethra with a cotton applicator moistened with 1 to 1000 bichloride and then did not wash away the superfluous antiseptic solution with water. Even when a vigorous effort is made to wash away the traces of the bichloride solution, it seems questionable whether any such tests can be considered as truly reliable, since minute traces of the antiseptic may hinder the growth of bacteria. The argument that Schenck and Austerlitz bring forward to support their view, namely, that out of 10 cases of cystitis in which this technique had been employed the same germs found in the bladder occurred eight times in the urethra, is not conclusive. For here we have bacteria multiplying in the presence of a pathological condition, of stronger growth and, hence, more resistant to the deleterious action of an antiseptic. The method of Piltz was simply to wipe the meatus urinarius with a piece of sterile cotton before introducing the platinum loop.

This brings us to the point, perhaps, of greatest importance—the quantity of material removed for examination. Franz has shown in his investigations on the bacteriology of the lochia that the number of positive findings is directly dependent upon the quantity of material inoculated. It certainly would not seem immaterial whether a platinum wire was merely touched to the urethral mucosa or whether a platinum loop was used as a sort of curette to scrape off as much of the urethral secretion as possible. Schenck and Austerlitz used a straight platinum wire, and hence it is not surprising that they had fewer, positive results.

The difference in the character of media upon which the material is inoculated is also important. It is evidently a mistake to employ only sterile urine for this purpose, as

Rovsing did, and to exclude all those cases in which no urine fermentation took place. Pathogenic bacteria may be present without the occurrence of any such fermentative change. Furthermore, Melchior's plan of allowing the first inoculation in broth to remain for seven days in an incubator, before making any effort at isolation, gives too much opportunity for some contaminating germ to multiply at such a rate as to cloud the results. Aside from these two there was no important difference among investigators in this regard.

It is a matter of considerable weight how long and how carefully the various colonies were studied. The requirements for the identification of the colon bacillus are many, and where the authors, as in Baisch's case, have failed to state on what ground they have termed a certain bacterium the colon bacillus, the surmise cannot be avoided that the identification may have been incomplete. Such an assumption would explain why Baisch found the colon bacillus in two-thirds of his ambulatory patients, while Piltz, working in the same clinic, found it in but 18 per cent. Furthermore, it is necessary that the agar plates be studied daily or at least every other day for ten days, as Piltz recommends. Every now and then I found a colony making its first appearance a week after inoculation.

Finally, the different investigators have different ideas as to what constitutes a pathogenic bacterium. Doubtless, animal inoculations are of great importance in determining the virulence of a particular microörganism, but we are hardly justified in refusing to call a microörganism pathogenic simply because it does not kill one sort of test animal. This, I believe, is one of the reasons why Schenck and Austerlitz report so few pathogenic bacteria.

From the above it is evident that the reports of previous investigators are not as inconsistent as they would seem at first sight. The two men who have most carefully avoided any source of error are Savor and Piltz, and their results

are generally in accord. In fixing the choice of a technique for my own work I thought it preferable not to undertake any new method, but rather to follow in its essentials the procedure of Piltz.

The women selected were for the greater part gynecological patients. None of them had any disease of the urinary tract, or any acute inflammatory trouble in the pelvis. They were in part private patients, in part patients of the gynecological clinic of the Washington University Hospital. For permission to use this latter material, I wish to express my thanks to Dr. H. S. Crossen.

The patient was put on the table with thighs separated, and while an assistant pulled apart the labia the urethral meatus was dried with a piece of sterile cotton and a platinum loop passed into the urethra, special care being taken to avoid contact with the edge of the meatus. The loop was passed in about 0.5 cm. and gently rubbed against the walls of the urethra in various directions. The material thus obtained was inoculated upon fluid agar and poured into a Petrie dish.

In a few cases the specimen was taken through a urethral bivalve speculum in order to avoid contact with the external meatus. There was no appreciable difference in the results. Williams' investigations on vaginal bacteria in pregnancy clearly show how impossible it is to introduce a speculum without carrying into the deeper portions germs from the outside. What applies to the vagina must, it seems to me, apply with double force to the urethra. The narrow lumen of this canal hardly permits the satisfactory use of a speculum for this purpose. An apparatus similar to the Menge tube would likewise be out of place in the urethra, both because of the size of the meatus and because of the scantiness of the secretion.

The agar plates already referred to were put in an incubator at 37° C. and studied after twenty-four hours, and at least

every other day for ten days. Wherever the colonies were not too numerous they were numbered and the morphology, motility, and staining properties of their constituent bacteria studied. If there was anything suspicious of Staphylococcus pyogenes albus, Staphylococcus pyogenes aureus, Streptococcus pyogenes or the colon bacillus, further inoculations were made. Investigations were restricted to these bacteria because they are the organisms that are almost exclusively to be found in the catheter cystitis of women (Brown, Baisch) and because the identification of all germs would have been a Herculean task.

If there appeared upon the agar plates colonies resembling those of coli, composed of short, feebly motile, Gram-negative bacilli, inoculations were made on litmus milk, on Dunham's peptone or broth, and upon neutral-red-glucose agar. The last-named medium contained 1.5 per cent. of agar, 0.25 per cent. of glucose, and 1 per cent. of a concentrated aqueous solution of neutral red. The colon bacillus will cause this medium to turn a fluorescent green color, at the same time splitting it up by gas formation. The work of Moore-Revis, Scheffler, and Wolff shows this to be an important test for coli. If the suspected bacillus gave this reaction, formed indol in the broth, and coagulated and turned red the litmus milk, it was classed as the Bacillus coli communis.

The staphylococcus was recognized by its growth on agar, its morphology and staining qualities, and its liquefaction of gelatin. The streptococcus was recognized by its growth on agar, gelatin, and broth, and its morphology and staining qualities.

No animal inoculations of these bacteria were made, for several reasons. In the first place, those made by previous investigators show pathogenesis to be the rule. In order to be thorough, each pathogenic colony would have to be tried on the three main test animals: the guinea-pig, the white mouse, and the rabbit. This would have involved a very

considerable expense in such a long series of experiments. But, above all, I desisted from animal inoculations because the source of error is great and because the question of the virulence of a microörganism is not of prime moment in considering this subject. Natvig has shown that on the vulva of pregnant women a streptococcus may be found that possesses very little virulence, but that under the favorable conditions of the puerperium may develop into an organism of the most virulent type. If the same microörganism, whether it be staphylococcus, streptococcus, or colon bacillus, is capable of changing from a non-virulent to a virulent type under certain favorable conditions of growth, it must, it seems to me, be included among the pathogenic bacteria even if it does not kill the test animal. Postoperative conditions, particularly where there is much bladder traumatism, might readily increase the virulence of comparatively harmless urethral germs introduced into the bladder so as to produce a severe inflammation of that organ.

Of the 45 patients whose urethral secretion was examined, 5 were confined to bed; the others were out-clinic cases. As stated, none had any disease of the urinary tract or acute pelvic inflammation. The diagnosis was most often retroversion, early pregnancy, neurasthenia, chronic endometritis, myoma uteri, etc.

On examining the results of these 45 cases, as tabulated in Tables II and III, it will be seen that in 25 of the out-clinic patients (62.5 per cent.) pathogenic germs were found. These bacteria were Staphylococcus pyogenes albus, 23 times (57.5 per cent.), Staphylococcus pyogenes aureus once (2.5 per cent.), Streptococcus pyogenes twice (5 per cent.), bacterium coli twice (5 per cent.). In 17 cases (42.5 per cent.) various other bacteria and fungi developed, non-liquefying micrococci, Gram-positive bacilli, and the like. Seven times (17.5 per cent.) the cultures remained sterile. Of the 5 bed patients, 4 had pathogenic germs in their urethræ.

TABLE II.

Number of case.	Age.	Children.	Disease.	Size of urethra.	Number of colonies.	Staphylococci.	Streptococcus.	Bacillus coli communis.	Other bacteria.	Sterile.
1. Mrs. M.	38	2	Pruritus vulvæ.	Medium.	2	.....	.....	+	+	
2. Mrs. Kr.	29	2	Neurasthenia.	Small.	.....	.....	.....	.....	.....	+
3. Mrs. Cl.	35	1	Parametritis.	.....	Numerous.	.....	.....	.....	+	
4. Mrs. Wi.	37	3	Endometritis.	Large.	Many.	.....	.....	.....	+	
5. Mrs. McD.	24	2	Salpingitis, chronic.	.....	4	+				
6. Mrs. K.	67	7	Total prolapse.	Large.	.....	.....	.....	.....	.....	+
7. Mrs. Li.	25	2	Parametritis.	Small.	2	+				
8. Mrs. St.	47	2	Retroversion.	Small.	15	+	.....	.....	+	
9. Mrs. P.	35	2	Retroversion.	Medium.	.....	.....	.....	.....	.....	+
10 Mrs. D.	44	3	Endometritis.	Large.	1	.....	.....	.....	+	
11. Miss Sh.	25	0	Pregnancy.	Small.	Numerous.	+	.....	.....	+	
12. Mrs. G.	29	3	Tubal pregnancy.	Medium.	Numerous.	.....	.....	.....	+	
13. Mrs. H.	46	7	Cystocele.	Large.	Numerous.	+				
14. Mrs. Jo.	33	5	Retroversion.	.....	Numerous.	+				
15. Mrs. B.	34	3	Tubal pregnancy.	Large.	Numerous.	+				
16. Mrs. Ya.	22	1	Myoma.	.....	A few.	+				
17. Mrs. St.	47	2	Retroversion.	Small.	12	+	.....	....	+	
18. Mrs. Po.	20	0	Pregnancy.	Small.	A few.	+				
19. Miss D.	27	0	Parametritis.	Small.	A few.	+	.....	.....	+	
20. Miss W.	18	0	Endometritis.	.....	A few.	.....	.....	.....	+	
21. Mrs. Wi.	20	0	Pregnancy.	.....	.....	.....	.....	.....	.....	+
22. Miss Win.	16	0	Parametritis.	Small.	6	.....	.....	+	+	
23. Mrs. K.	46	7	Menopause.	Very large.	.....	.....	.....	.....	.....	+
24. Mrs. L.	24	0	Retroversion.	Small.	4	+ albus and aureus.				
25. Mrs. Sn.	39	4	Retroversion.	Large.	.....	.....	.....	.....	.....	+
26. Miss Th.	25	0	Retroversion.	Small.	A few.	+	+			
27. Mrs. Sh.	29	0	Parametritis.	Small.	Many.	+	.....	.....	+	
28. Mrs. L.	22	0	Endocervicitis.	Small.	Numerous.	.....	.....	.....	+	
29. Mrs. Wo.	30	1	Pregnancy.	Medium.	A few.	+				
30. Mrs. J.	31	4	Neurasthenia.	Large.	Numerous.	+	+	.....	+	

31. Miss J.	23	0	Parametritis.	Small.	3	+				
32. Mrs. Pa.	35	2	Retroversion.	Medium.	Numerous.	.....	.....	.....	+	
33. Mrs. Si.	51	2	Total prolapse.	Small.	.....	.....	.....	.....	.....	+
34. Mrs. Wi.	37	3	Endometritis.	Large.	Numerous.	.....	.....	.....	+	
35. Mrs. Z.	29	1	Lacerated perineum.	Medium.	2	+				
36. Miss D.	27	0	Parametritis.	Small.	Numerous.	+				
37. Mrs. G.	29	0	Endometritis.	Small.	Many.	+	.....	.....	+	
38. Mrs. F.	23	1	Endometritis.	Medium.	A few.	+				
39. Mrs. P.	57	1	Neurasthenia.	Very large.	1	+				
40. Mrs. H.	30	1	Retroversion.	.....	2	+				

TABLE III.—Postoperative Cases.

Number of case.	Age	Children.	Disease and operation.	Number of days after operation.	Number of colonies.	Urethra.	Staphylococci.	Streptococcus.	Bacillus coli communis.	Other bacteria.	Sterile.
1. Mrs. Ma. . . .	20	0	Endometritis: currettement.	7	19	Small.	+	.....	.....	+	
2. Mrs. H. . . .	30	1	Retroversion: ventrosuspension.	17	8	.....	+	.....	.....	+	
3. Mrs. F. . . .	32	0	Fibroid: hysterectomy.	2	5	Large.	.....	.....	+	+	
4. Mrs. Gr. . . .	28	3	Tubal gestation: salpingectomy.	20	.....	Medium.	.....	.....	.....	...	+
5. Mrs. Oh. . . .	20	0	Endometritis: currettement.	13	Numerous.	Small.	+	.....	.....	+	

Three times Staphylococcus pyogenes albus was found and once the colon bacillus. Four times other bacteria were also found and only once was the urethral secretion sterile. Table IV gives a clear picture of these results.

A further analysis of Table II shows that pathogenic germs were found more often in the small urethra of nulliparous women under thirty years, and less often in the larger urethræ of multiparous women over thirty years of age. This may be due to the greater moisture of the external genitals where the parts are more closely approximated, as in the nulliparous women. Such an assumption would seem to be supported by the fact that in both cases of complete prolapse examined the urethra was found free from bacteria.

Comparing my results with those of Piltz, no such decided difference is seen as not to be readily explicable by the comparatively small number of examinations made. Approximately 500 patients have been examined by Savor, Piltz, and myself. Our results show that in about one-half of all patients not confined to bed the urethra contains pathogenic germs, and that of these germs the Staphylococcus pyogenes albus is the most frequent. Piltz has shown that the colon bacillus is the most variable of these bacteria, being often found on one examination and then not in any subsequent ones. Hence the difference in results on this point is not surprising. The small number of streptococci found by both Piltz and myself may, perhaps, be explained by the fact that only solid media were used for inoculation.

As Walthard, Gönner, Bumm, and others have pointed out, such media are less favorable for the development of streptococci than bouillon. This drawback, however, is more than counterbalanced by the increased risk of contamination when fluid media are used (Krönig).

TABLE IV.

Number of cases.	Pathogenic bacteria.	Staphylococcus pyogenes albus.	Staphylococcus pyogenes aureus.	Coli.	Streptococci.	Other bacteria.	Sterile.
40 out-clinic patients	25 (62.5 per ct.)	23 (57.5 per ct.)	1 (2.5 per ct.)	2 (5 per ct.)	0 (5 per ct.)	17 (42 per ct.)	7 (17.5 per ct)
5 bed patients	4 (80.0 per ct.)	3 (60.0 per ct.)	.....	1 (20 per ct)	.....	4 (80 per ct.)	1 (20.0 per ct.)

TABLE V.

Number of case.	Age.	Children.	Urethra.	Bacteria in urethra.	Bacteria in urine (agar).	Bacteria in urine (broth).
1. Miss Th.	25	0	Small.	Staphylococci and streptococci.	Staphylococci and streptococci.	
2. Mrs. J.	31	4	Large.	Staphylococci and streptococci.	Staphylococci and streptococci.	
3. Mrs. K.	67	7	Large.	Staphylococci.	Staphylococci.	
4. Mrs. Ha.	46	7	Large.	Staphylococci.	Staphylococci.	Staphylococci.
5. Mrs. Jo.	33	5	.....	Staphylococci.	Staphylococci.	Staphylococci.
6. Mrs. Str.	47	2	Small.	Staphylococci and a gram. neg. bacillus.	Staphylococci.	
7. Mrs. Ko.	49	7	Large.	.....	Gram. neg. bacilli, not coli.	
8. Mrs. Sh.	29	0	Small.	Staphylococci.	Staphylococci.	

It seems more than likely, therefore, that in a certain percentage of cases the catheter passing through the urethra would be bound to carry pathogenic germs into the bladder. There is considerable evidence to corroborate such a view. Out of thirteen women suffering from a catheter cystitis after operation, Savor found in ten instances the same micro-organisms in the cystitic urine that had been isolated before operation in the urethra. Rovsing, likewise, found in 6 cases the same germs in urethra and bladder after catheterization.

To elucidate this point, I made eight tests in the following manner: The urethral secretion was obtained in the usual way; then a sterilized catheter was introduced into the bladder and the first 10 c.c. caught in a sterile test tube. A portion of the urine was inoculated on agar plates, and in a number of cases also upon broth. Table V shows the results of these examinations.

In 6 out of 8 cases the bacteria found in the urine were identical with those found in the urethra. In the 2 remaining cases both urine and urethra were sterile. The assumption, therefore, that if there be pathogenic bacteria in the urethra, these are of necessity carried by the catheter into the bladder, is confirmed by actual bacteriological tests.

Urethral germs, it would seem, may occasionally ascend into the bladder spontaneously, without the assistance of the catheter. Reymond found the colon bacillus in the urine of 7 cases of cystitis in which no catheterization had taken place. Baisch, who also saw cases of spontaneous infection, favors this view as against a migration of germs from the rectum into the bladder. It is difficult to draw any positive conclusions regarding these cases of spontaneous infection.

Piltz quotes me as saying that postoperative cystitis is due to migration of bacteria from the rectum through the bladder wall into the vagina. I certainly made no such statement; the emphasis was always laid on catheter infection. I

only offered it as a possible explanation of these cases of spontaneous infection. While still upholding the possibility of such a mode of infection, my own more recent investigations, together with the work of Baisch and Piltz, make a spontaneous infection from germs in the urethra seem a less circuitous explanation of these cases.

After this consideration of the frequency with which pathogenic germs are found in the female urethra and the manner in which they may gain admittance to the bladder, there still remains the discussion of the prophylactic measures that may be taken in order to decrease the risk of infection where the catheterization becomes necessary. I have treated this subject at some length in a previous article ("Postoperative Cystitis in Women: Cause and Prevention," *Surg., Gyn. and Obst.*, February, 1906), and wish here to take up only such points as were not considered at that time.

The two important things to guard against in the prevention of cystitis are of course trauma and infection. Under the head of trauma I wish only to mention in passing the special catheter recently devised by Gersuny (*Zent. f. Gyn.* 1906, Nr. 4). It is of hard rubber with a small lumen, has no side openings, and has a circular guard to prevent its introduction too deeply into the bladder. Gersuny believes that it lessens the risk of traumatism, and thus also of cystitis, and sees a support for his contentions in the fact that only 1 case in 35 developed a cystitis after its employment. Looking over his list I find that only 1 of these 35 patients had to be catheterized more than fifteen times, or counting an average of three catheterizations to the day, longer than five days. This is no better than the results obtained with the ordinary glass catheter. Furthermore, there is strong evidence against the assumption that the trauma in cases of cystitis is produced by the catheter. Postoperative cystoscopic examinations of the bladder by Stoeckel and Kolischer show that ordinarily the trauma is not about the margin

of the internal sphincter, but lies about the ureteric openings or in the bas fond and is dependent upon operative manipulations or interference with the blood supply. I cannot see that Gersuny's catheter offers much hope for improved results in postoperative cystitis.

The prophylaxis of infection I shall here consider only in relation to urethral bacteria. Is there any way to avoid carrying these germs, many of which are pathogenic, into the bladder? To a certain extent the flow of urine itself cleanses the urethra. Baisch found that, in patients who were confined to bed and were allowed to urinate only twice in twenty-four hours, the urethra after five days invariably contained colon bacilli. The multiplication of urethral bacteria can, therefore, be partly prevented by increasing the number of urinations and the total quantity of urine.

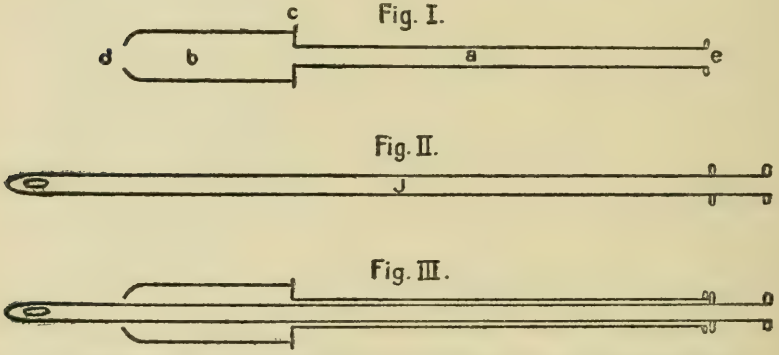
Melchior made the following tests to see whether the urethra could be cleansed. He disinfected the meatus with a 3 per cent. carbolic-acid solution, introduced a sterilized catheter and collected the last portion of the urine in the bladder. In nine patients (six men and three women) so examined the urine was never found to be sterile. Where, however, previous to the introduction of the catheter the urethra was irrigated ten times with a boric-acid solution, he obtained in 7 cases (four men, three women) a urine free from all bacteria. These cases of Melchior were apparently all ambulatory patients, at any rate there is no record whether the urethra in these cases contained many or few germs before the irrigation. We know that the number of urethral bacteria is much greater in bedridden patients than in ambulatory cases, so it is very questionable whether in postoperative cases these urethral irrigations would be sufficient. At my suggestion such boric-acid urethral irrigations were tried before each catheterization in several cases at Wertheim's Hospital, in Vienna, but did not suffice to prevent infection. All of these cases had, however, been

operated on for uterine cancer by the radical method, the vesical trauma was hence considerable, and even a very few germs might have sufficed to produce an infection.

In order to see to what extent such an irrigation would free the urethra from bacteria, I made the following tests in 3 cases: The urethra was irrigated several times with sterile water. Then a drop of a gelatin prodigiosus culture containing (as counts from the diluted material showed) approximately 1,000,000 bacilli, was carried by means of a platinum loop into the urethra and smeared over its surface for a distiance of 2 to 2.5 cm. By means of a glass syringe the urethra was now washed out fifteen or twenty times with sterile water (a total of 150 c.c. being used). Then after drying the meatus with cotton, the platinum loop was again passed into the urethra, and cultures were made from the material obtained. In each of the 3 cases, prodigiosus colonies developed in considerable number, there being respectively nineteen, twenty-one, and twelve colonies at the end of two days. It would seem, therefore, that when the number of bacteria is large, a urethral irrigation, even if prolonged, is not a sufficient protection.

In view of the difficulty of properly cleansing the urethra it naturally suggested itself to search for some means, such as a shield, that would prevent the catheter from coming in contact with the urethra. The first of these so-called "double catheters" was devised by Melchior. His shield consisted of a plain-glass tube of somewhat large size; over the end was fastened a thin rubber film. This was introduced with the usual precautions up to the internal sphincter, and a glass catheter of small bore introduced through it, perforating the film and entering the bladder. The urine obtained by its use was found to contain fewer germs, but was not sterile. Melchior confesses that some germs are doubtless deposited on the rubber film in introducing the shield and transported by the catheter into the bladder.

The double catheter of Rosenstein (see illustration) is in some ways a more practical instrument for this purpose. In answer to the a priori objections I made on a previous occasion (large caliber, danger of trauma, insufficient protection against infection) Rosenstein very truly says that I should not criticise without giving the instrument a trial. I have now used the Rosenstein double catheter in some 15 to 20 cases and as a result of bacteriological examinations made in a number of them have come to the con-



Cross-section of the latest model Rosenstein double catheter (half size). *A*, inner catheter; *B*, urethral shield; *C*, catheter and shield put together.

clusion that my original assumptions were correct. In the first place I found several times that the shield was too large to permit of its introduction without considerable pain. The sharp edge of the shield in these cases is apt to cause traumatism. In two patients a slight bleeding resulted, in spite of the greatest care in its introduction.

As proof that his catheter prevents infection Rosenstein submits as evidence his clinical experience. In but 1 out of 34 cases, where repeated catheterization was done, with his instrument, did an infection follow. Yet in but a small proportion of these cases was there any operative trauma

to the bladder, and only seven times was catheterization prolonged over five days, so his results are hardly conclusive.

To see how great a protection against urethral bacteria was obtained by this instrument the following tests were made: A small quantity of a fresh agar culture of bacillus prodigiosus (selected because of its harmlessness and characteristic red-colored growth) was mixed with 10 c.c. of sterile bouillon, and three loops of this dilution were introduced into the urethra. The Rosenstein catheter was then passed into the bladder and 5 to 10 c.c. of the urine were removed for examination. Agar plates were inoculated with this urine. As the control of the number of bacteria originally introduced, plates were inoculated at the same time with three loops of the same prodigiosus dilution. Table VI shows the results of these tests. In Cases 7 and 8 a single loop of a liquefied gelatin prodigiosus culture was used.

TABLE VI.

Number of case.	Number of prodigiosus colonies on control plates.	Number of prodigiosus colonies in 5.10 c.c. of urine obtained with Rosenstein catheter.
1. Mrs. De.	32,000	42
2. Miss Di.	20,000	6
3. Mrs. O'F.	120	7
4. Mrs. Su.	30,000	3
5. Mrs. Fi.	3,000	7
6. Mrs. Ing.	3,000	1
7. Mrs. Bu.	1,000,000	89
8. Miss Pe.	1,000,000	95

It seems likely from these tests that the Rosenstein catheter reduces the number of germs introduced into the bladder; but it is far from providing us with a means of sterile catheterization. The same objections that apply to Melchior's

instrument apply likewise to it. No shield devised on the principle of a speculum can prevent the transplantation of germs first from the meatus to the end of the shield and then from the end of the shield by means of the catheter into the bladder.

One sort of shield that suggested itself to me and one that would not be open to these objections is an inverted rubber cylinder that would unfold itself over the walls of the urethra as the catheter was introduced. In this case there would be no pushing inward, but simply an inverting of the shield. The technical difficulties in the construction of such an instrument for such a narrow canal as the urethra have, however, deterred me from putting this idea to practical use.

Until some more practical form of double catheter has been devised I believe we should hold to the ordinary glass form. It seems inevitable, therefore, that in a considerable percentage of all cases, greater where the patients are confined to bed, germs will be carried by the catheter into the bladder. If these germs happen to be of a pathogenic variety and the resistance of the bladder is lessened through trauma or congestion, we may have an infection resulting.

Complete asepsis being impossible, we must finally resort to such antisepsis as will not prove too irritating. Ordinarily, this will hardly be necessary for a single catheterization. But where a patient after operation or confinement is unable to void urine spontaneously for a considerable length of time, it is certainly advisable to use boric-acid irrigations after each catheterization, as suggested by Baisch, to counteract the effect of the germs that may have been deposited in the bladder. Such drugs as cause the formation of formaldehyde in the urine likewise have a marked bactericidal effect (Wannier Sachs, Schumburg), and should be administered in all these cases.

The relationship of urethral bacteria to the production of

catheter cystitis in women may be summarized in the following paragraphs:

1. The normal urethra free of disease is sterile in only a small proportion of cases. In my series, out of 45 cases it was sterile eight times.

2. In about one-half of the total number of urethræ examined, pathogenic germs are present. The percentage in my series was as high as 62.5 per cent.

3. Of the pathogenic bacteria found, Staphylococcus pyogenes albus is the most common. The occurrence of the colon bacillus seems very variable. It is found frequently where patients are confined to bed. In my series it was isolated only three times.

4. That these urethral bacteria are actually carried into the bladder by catheterization is shown in eight examinations in which the urethral secretion and the urine obtained by catheterization were compared. In 6 cases the bacterial findings were identical, and in the other 2 cases the difference was a slight one.

5. Irrigation of the urethra with boric acid removes a large proportion of the urethral bacteria, but where the number is great, does not suffice to remove all.

6. The double catheters devised for the purpose of avoiding contamination with the urethral bacteria do not as yet deserve to be generally used. Tests made with the instrument of Rosenstein show that its protection is only a partial one. It has other objections, so that ordinarily the usual glass catheter is preferable.

7. Wherever repeated catheterization becomes necessary, therefore, we should advise certain precautions to prevent an infection of the bladder by urethral bacteria. Give urotropin or an allied product internally. Catheterize in the following way: Introduce the ordinary glass catheter part way into the urethra and irrigate the urethra with one-half pint of boric-acid solution, taking care that the fluid does

not enter the bladder. Now pass the catheter into the bladder, empty the urine and irrigate the bladder with one to two pints more of boric-acid solution. These precautions may seem troublesome, but laboratory experiments and clinical experiences thus far show that herein lies the only reliable prophylaxis against the production of a catheter cystitis.

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DEFERRED OPERATION FOR RUPTURED ECTOPIC GESTATION.

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What to do when suddenly confronted by deep-seated hemorrhage sufficient to cause alarming symptoms is a question which always commands serious consideration. Since the time of Parry's eloquent appeal for surgical intervention, and Tait's first successful operation, much has been said in favor of immediate removal of the products of a ruptured, ectopic-gestation sac.

Reference to current text-books on gynecology, surgery, and obstetrics shows many statements similar to those which follow:

"The patient's only hope is immediate abdominal operation." (B. C. Hirst, *Text-book of Gynecology*, 1903, p. 440.)

"Operate immediately, whether the rupture is intraperitoneal or extraperitoneal. It is unwise to wait for reaction." (Charles B. Penrose, *Text-book of Gynecology*, 1897, p. 317.)

"The indication is to operate in every case without unnecessary delay. We must not wait for reaction from collapse or shock to set in before operating, as the patient may faint in the meantime from loss of blood." (Ashton, *Text-book of Gynecology*, 1905, p. 567.)

"Operative interference is indicated in all cases except when the patient is moribund from intra-abdominal hem-

orrhage." "The more rapidly progressive the collapse, the more urgently immediate operation is demanded." (Fowler's *Treatise on Surgery*, 1906, vol. ii, p. 403.)

The foregoing opinions are time-honored and have received the sanction of many writers of extensive experience, excellent results, and wide influence.

In the hands of exceptional operators, no doubt such a course of action, judiciously applied, might result in a series of brilliant achievements. Yet it seems to me that such unqualified expressions of opinion by teachers of wide influence is most unfortunate; first, because such opinions constitute the basis of action for so many medical men, whose experience with this particular affection is limited; and, second, because actual facts do not warrant such conclusions.

If it be true that the woman's only hope lies in an immediate abdominal operation, then operation is imperative, and the lesser evil is chosen, even though the surroundings are bad, equipment meagre, preparation crude, the operator inexperienced, the assistants and attendants inadequate and unskilled, and the bloodless patient's margin of reserve strength narrow indeed, as it must usually be if danger of death is imminent.

One can scarcely conceive of less favorable conditions for operation than those enumerated. Certain death without operation should be the only consideration that would impel one to open the abdomen under such unfavorable circumstances.

On the other hand, it is my firm conviction that actual facts do *not* warrant the conclusion that 70 or 60 or even 10 per cent. of those who sustain a rupture of an ectopic gestation will, of necessity, bleed to death.

If this view is correct, then immediate operation should *not* be done unless all conditions are favorable for a successful issue. This, it seems to me, is the attitude teachers and

operators should maintain. My reasons are briefly as follows:

1. It has been my privilege to come in professional contact with approximately 100 cases of ectopic gestation (as operator or assistant), and I have yet to see the first patient bleed to death at the time of rupture.

2. Dr. Karl Hartog, of the Landau Clinic, tells me that he has made a complete review of German statistics and finds that not more than 5 per cent. of the victims of ectopic pregnancy die from hemorrhage at the time of rupture.

3. A study of the general subject of hemorrhage as it relates to the lungs, the stomach, the intestines, and the uterus shows that death rarely occurs from primary hemorrhage from any of these sources.

4. A study of the functions of the several structures under consideration shows that there are definite physiological reasons why bleeding is likely to recur from the stomach, lungs, and intestines; whereas, there is rarely ever any physiological reason for repeated hemorrhages in the case of a ruptured ectopic pregnancy.

5. The margin of reserve strength above the absolute needs of existence may be reduced to a very narrow limit by a severe hemorrhage.

6. This margin may be wiped out of existence by a very slight additional source of depression, or it may gradually increase to normal if the patient simply hibernates for a time.

7. Many operators, who advocate immediate operation, have reported cases where rupture occurred, the patient's condition quickly became so desperate that death seemed inevitable, either with or without operation, and, to their surprise, the patients rallied sufficiently to permit of operation some hours or days later.

Personal Observations. While assisting Dr. Werder, and in the course of my individual work, it has been my privilege to see approximately 100 cases of ectopic ges-

tation. Of that number, two patients were delivered of living children at or near term; one patient had an interstitial pregnancy, which was recognized before rupture; but operation was not permitted until that accident had occurred. Perhaps 40 were found to be tubal abortions. Doubtless 50 were ruptured tubes. Of this last number, the rupture occurred within one-half inch of the uterus more than a dozen times. In these cases the bleeding seemed greater and depression far more marked than in other types. Not once did death occur, however, either in the case of ruptured interstitial pregnancy or where the isthmus of the tube was the seat of injury. Yet it is this class of cases particularly which the advocates of immediate operation say are uniformly fatal if not rescued by immediate operation. Thus, one operator tersely says the cases in which rupture occurs at the fimbriated end of the tube belong to the surgeon; whereas those which rupture at the proximal end belong to the undertaker.

One of America's foremost surgeons, reporting his series of about 100 cases of ectopic gestation, stated that those in which distal rupture or abortion occurred, all but 6 per cent. recovered from immediate operation, although 42 per cent. died, where the proximal end of the tube ruptured. This death rate in proximal ruptures is most gratifying, if it be true that all would have died had further delay occurred. In my series of proximal ruptures, about the same number as that of the gynecologist quoted, operation was purposely deferred; and yet not one of those patients died from rupture or following deferred operation. My experience would lead me to believe that, in the presence of the more grave types of hemorrhage, it is particularly important to avoid adding even slight depression to that which already exists. In the series of cases just quoted results would seem to bear out that view. Thus, when hemorrhage was not of the graver type all recovered. On the other hand,

where hemorrhage *was* of the graver type, 42 per cent. were unable to withstand the loss of blood plus the added depression incident to operation.

During a very interesting conversation with Dr. Karl Hartog, of the Landau Clinic, last summer, the doctor strongly advocated immediate operation for rupture of an ectopic pregnancy. His plea was not based upon any idea that the mortality from the disease was inordinately high, but that the mortality of operation was even lower, and that, by immediate operation, adhesions and other types of post-operative morbidity were quite materially reduced in frequency and extent.

HEMORRHAGE. Gastric, intestinal, pulmonary, and uterine.

Gastric. Immediately fatal cases of gastric hemorrhages are comparatively rare. (Ewald, *Diseases of the Stomach*, p. 248.)

"Death rarely results from the (gastric) hemorrhage." (Osler, *Practice of Medicine*, p. 418.)

"The vomiting of blood comes unexpectedly and suddenly; a large quantity of blood is lost, and the patient suffers, often in an extreme degree, from the symptoms of hemorrhage. The pulse becomes feeble and fluttering, the face waxen, the body surface cold and clammy. For a time the symptoms may give rise to serious alarm, but a rally is seldom long delayed . . . The characteristics of hemorrhage from acute gastric ulcer are, therefore, . . . the marked tendency to spontaneous cessation, the infrequency of a repetition of the hemorrhage in any but trivial quantity, and the transcience of the resulting anemia."

Also, regarding hemorrhage from chronic, gastric, and duodenal ulcer, he makes four classes.

A. The hemorrhage is latent or concealed, is always trivial, and often inconspicuous.

B. The hemorrhage is intermittent, but in moderate quantity, occurring spontaneously and with apparent caprice at

infrequent intervals. The life of the patient is never in jeopardy from loss of blood, though anemia is a persistent symptom.

C. The hemorrhage occurs generally, but not always, after a warning exacerbation of chronic symptoms. It is rapidly repeated, is always abundant, its *persistence* and excess cause grave peril, and will, if *unchecked*, be the determining cause of the patient's death. (Italics mine.)

D. The hemorrhage is instant, overwhelming and lethal. (The author says: "In my own experience, only one such example has occurred, a large oval opening being then found in the splenic artery.") (B. G. C. Moynihan, report upon the surgical treatment of non-malignant diseases of the stomach. Presented to the surgical section of the British Medical Association, July, 1905.)

"Cases in which hemorrhage is so severe as to cause death are rare." (Riegel.)

"A single hemorrhage is rarely so profuse as to cause death," also, "It is exceptional for gastric hemorrhage to prove fatal." (Pepper's *System of Medicine*, vol. ii, pp. 494 and 585.)

Like opinions are expressed by Pepper (*Amer. Text-book of Med.*), Ziemssen (*Cyc. of Medicine*, vol. vii), Martin and Fry (*Reference Handbook of Med. Sci.*, vol. vii, p. 512), Thompson (*Practice of Medicine*, p. 413), and others.

Recently, Collier has reported 180 consecutive cases of gastric hemorrhage treated medically without mortality. Commenting upon this observation, Stengel and Edsall say their experience is in strict accord. Russel (*Lancet*, January, 1904) reports 89 cases of hemorrhage from gastric ulcer, with no known death from hemorrhage. True, this is not a universal experience; but might it not be if the same measures were employed with equal skill?

Intestinal Hemorrhage. "In order that a patient should finally die as a result of hemorrhage (typhoid), its repeated

occurrence is necessary." "Fulminating, rapidly fatal cases are not common. A fatal termination in the course of two or three days is not rare, after a repetition of hemorrhages." (Curschmann, Nothnagel's *System of Medicine*, pp. 222–224.)

"Very rarely a patient will bleed to death" from a single hemorrhage. (Tyson, *Practice of Medicine*, 1896, p, 28.)

"In 1500 cases of typhoid fever treated in my wards, hemorrhage occurred in 118, with death in 12 cases." (10 per cent.). (Osler, *Practice of Medicine*, 1906, p. 80.)

The death rate from recurrent hemorrhage, together with persistence of the original disease (typhoid fever) is variously estimated at from 10 to 44 per cent. by such observers as Osler, 10 per cent.; Tyson, Nothnagel, Leibermeister, 38 per cent.; Homolle, 44 per cent.; Griesinger and others, 30 per cent.

Pulmonary. Hemorrhage in the early stage of phthisis may be profuse, but rarely dangerous. In advanced stages, it may be the immediate cause of death. (Loomis, *Practice of Medicine*, p. 210.)

Even in advanced phthisis, patients seldom die from the immediate effect of hemorrhage. (Thompson, *Practice of Medicine*, p. 248.)

In phthisis, hemorrhage may be the direct cause of death, but, as a rule, the patient survives it. (*Strumpell*, p. 203.)

Hemorrhages from bronchi may be small or large, but even when large and continued for several days they are seldom fatal. (Delafield, *Amer. Text-book of Medicine*, vol. ii, p. 578.)

Uterus. Uterine hemorrhage occurring in the course of cancer; uterine fibroids, and arteriosclerosis of the uterine vessels may be persistent, repeated, and alarming; but death from a single hemorrhage is extremely rare. This observation is too common to permit of quoting authorities.

That recovery may take place after the sudden loss of a very considerable quantity of blood is shown by cases recorded by the following authorities:

Gastric Ulcer. A. W. Mayo Robson (*Lancet*, December 13, 1902). Case 5, 2 pints; recovery. Case 6, 2 pints; recovery. A. H. Breck (*Ibid.*, April 4, 1903), over 6 pints of blood by measurement in 2½ days; recovery. C. B. Keetley (*Ibid.*, June 8, 1901). Case 3, some quarts of blood; recovery. E. P. Joslin (*Boston Medical and Surgical Journal*, August 20, 1903, cli, p. 206), hand basinful of blood and repeated on following day; recovery.

Hemorrhage Complicating Typhoid Fever. W. Coleman (*Medical News*, March 29, 1902, viii, p. 592), typhoid fever patient lost in one hemorrhage 3 to 4 pints of blood; recovery. J. R. Durham (*Journal of the American Medical Association*, December 10, 1904, xliii, p. 1789), 3 pints fresh blood at one time, in all about 6 pints. B. F. Stahl (*Philadelphia Medical Journal*, February 25, 1899, p. 415, case 93), typhoid hemorrhage, 84 ounces; recovery.

Hemorrhage Postpartum. Edward Reynolds (*Annals of Gynecology and Pediatrics*, May, 1890, viii, p. 552), 2 quarts; recovery. J. N. Sligh (*American Journal of Obstetrics*, May, 1892, p. 65), 3 quarts; recovery.

It would seem that a sufficient number of recognized authorities have been quoted to sustain the point that primary hemorrhage from the stomach, intestines, lungs, or uterus may be severe, but rarely proves fatal.

Recurrence of Bleeding. The retching, vomiting, and churning due to fresh blood in the stomach, together with the digestion of the clots, afford sufficient reasons for persistent, repeated, and profuse hemorrhages from gastric ulcer.

There is likewise sufficient reason for intestinal hemorrhages to recur. The contents of the small intestines are normally liquid until they pass the ileocecal valve. When the blood is poured into the intestinal canal, as from a typhoid ulcer, it coagulates and stimulates more active peristalsis than normal. This vermicular action may very readily

squeeze the clot from the eroded vessel, or the processes of digestion may remove it. Again, the vessel gaps and hemorrhage returns.

So, also, with pulmonary hemorrhage. The normal functions are exaggerated, and breathing and coughing readily dislodge the clots, which afford temporary protection from bleeding.

Vascular changes, traumatism, and periodicity afford adequate cause for repeated, uterine hemorrhages.

In striking contrast to the foregoing conditions, in which repeated hemorrhages would seem the rule, we find bleeding from tubal abortion or a ruptured tubal pregnancy. In this affection there is no involuntary or physiological reason why a blood clot, once formed, should be dislodged or digested. In order for the clot to become detached, some extraneous cause must exist, such as exercise, or a careful or vigorous examination. Thus it is that formerly more than one of America's great surgeons has spoken of the treacherous nature of hemorrhage from a ruptured, ectopic gestation. In the older discussions one may find record of quite a number of experiences similar to the following: The speaker says he was called some distance to see a patient. The attending physician had made a correct diagnosis of ruptured tubal pregnancy, and expressed the opinion that hemorrhage had ceased. The consultant was likewise of the opinion that hemorrhage was not active. He had made a careful examination, and in every way concurred in the opinion of the family physician. The diagnosis was clearly ruptured, ectopic gestation; the bleeding had surely ceased. To defer operation seemed consistent with the patient's best interest, and yet scarcely had the consultant reached his home when he received word that the patient was dead from hemorrhage. Such experiences have led many men to overlook their own part in the tragedy and to attribute death to the vagaries of a treacherous disease. It seems to me

that a dispassionate analysis of events would, in the majority of such instances, show that hemorrhage had really ceased, but that it was started in even greater fury by the very examination which seemed so thorough.

Many instances are recorded in which rupture of a tube occurred, hemorrhage took place, was apparently slight, and ceased. The patient thought she was well, or was impatient. She accordingly resumed her usual duties. Following housework, a walk, or drive, she was suddenly seized with pain and a violent, internal hemorrhage. Protracted illness or death resulted.

It has been my fortune to see quite a number of cases in which repetition of hemorrhage occurred. With one exception, recurrence in these cases was directly attributable to some form of traumatism which seemed quite sufficient to dislodge a blood clot.

It is my belief that some such extraneous cause for recurrent hemorrhage invariably exists, except in that small group of cases in which the fetus continues to grow until a second rupture occurs. Conversely, it seems easily within the range of possibility to prevent such an accident, if proper precautions be observed.

In the following cases there were adequate causes for the repeated hemorrhages which occurred. Many others might be cited.

Mrs. L. was seen with her family physician, Dr. Lane, of East Pittsburg, March 17, 1905. March 6, her first rupture occurred. She was feeling so well at the end of eleven days that she disregarded the doctor's strict injunction to remain quiet. She got up and walked about a mile to attend to some business matters. While away from home she was seized with severe pain in the right side, became suddenly anemic, without the external loss of blood. When I saw her that afternoon, she was critically ill. Further delay was advised before transferring her to the hospital. After being

in the hospital twenty days (thirty days after the second, and forty-one days after the first attack), she seemed to be in good condition for the operation, which was done April 15, 1905. A quart of clotted blood, the surrounding membrane, the right tube containing a part of the fetal membranes which had not been expelled at the time of tubal abortion, and the left tube, which contained blood, were removed.

Her convalescence was uncomplicated and when seen October 4, 1905, she had gained twenty-four pounds. Her color was normal, she looked well, felt well, and menstruated without discomfort. Her field of operation was normal, there was no exudate, and no adhesions could be detected.

Mrs. R., aged 30 years, the mother of four children, has had four miscarriages. Late in February her first hemorrhage occurred. Early in March she had the second, which was quite severe, though she was in bed only a few days. Aside from that her movements were not restricted.

April 8 she called to see a physician on another floor in the building in which my office is located. She became suddenly ill and was brought up to my office. At that time she was very weak, pale, and short of breath. Her pulse was between 130 and 140, her temperature 99°. A blood examination showed: hemoglobin, 60 per cent.; leukocytes, 11,000; red blood cells, 3,820,000.

An ambulance was called and she was taken to the Allegheny General Hospital. She reacted promptly, and was thought to be in good condition for operation forty-seven days later.

At operation, April 25, we found a tubal abortion with three distinct clots of different ages, indicating three distinct hemorrhages. Each of the two more recent sacs containing more than a pint of clots.

Her convalescence was uncomplicated. She looked and felt perfectly well when seen three months later.

One of the points it has been my purpose to emphasize is

that operation for the removal of the products of an ectopic gestation should take place at an elective period and under favorable conditions. The elective periods are, in my judgment, before rupture or if rupture has occurred, within as short a time as the most favorable conditions demanded for other elective operations can be had. This may be at once, where little depression of health has been caused, or at any time within several weeks if the patient is well-nigh exsanguinated.

The following case is one in which early operation seemed consistent with the patient's best interests; the recent hemorrhage did not materially reduce her margin of reserve strength, and she was in the hospital when it occurred.

Mrs. L., aged 25 years, married two and one-half years. No children, one miscarriage two years ago. The history would indicate that a slight hemorrhage occurred April 30, five or six weeks after conception. A second hemorrhage, also slight, took place May 22. A third hemorrhage occurred after examination under ether, and a fourth one when she got out of bed.

She menstruated normally March 23; April 30 her period came on; continued five days and ceased for two days. She then had some pain in the pelvis and a dark bloody discharge appeared. The pain, soreness and discharge continued until the date of examination, May 30. May 22 she had a severe attack of pain in the right tubal region, which lasted ten or fifteen minutes. She grew pale and became very faint. She was in bed for a few days. Aside from that period of rest, however, her movements were not restricted, and she came a distance of thirty miles for examination and treatment.

The probable diagnosis of tubal abortion was made. She was sent to the Allegheny General Hospital and was examined under ether the next day, to decide whether or not operation was necessary. The mass was not larger than an English walnut, and her umbilicus was suppurating.

It was accordingly thought inadvisable to open the abdomen, especially as nature might readily care for a mass that size. Following the examination there was slight intra-abdominal bleeding. The day she got out of bed, bleeding was pronounced, but not exhausting. The following day the abdomen was opened and a pint of blood clot and both tubes were removed. There had been a right tubal abortion. Her recovery was uneventful.

More than once it has been my privilege to observe patients who were reduced to the very verge of dissolution by a sudden, severe hemorrhage. In those instances it appeared absolutely clear that even the slightest increase of depression would inevitably prove fatal. Under such conditions it seemed the course of wisdom to avoid further depression, such as would inevitably result from anesthesia and operation. In each instance she has rallied and completely recovered from the effects of acute anemia. A case in point will illustrate the degree of depression, the manner of inducing hibernation, the extent of recovery, and the quantity of blood found in the abdominal cavity at the time of the deferred operation.

Mrs. R. E. was admitted to my service at the Allegheny General Hospital, November 12, 1905. Her temperature was 100°. Because of the temperature and tenderness, pelvic examination was not complete. It showed a tender, globular, elastic mass the size of a lemon in the region of the right tube. She was put to bed. Four days later, while I was in my operating room, scarcely 100 feet away from the patient, and on the same floor, a nurse asked me to come quickly, and stated that Mrs. E. was dying. Her appearance was far from reassuring. Her lips were white, pupils dilated, cornea lustreless, extremities cold, pulse absent at the wrist, and her heart was beating too rapidly and feebly to permit of exact record, though the rate exceeded 180 beats per minute. It was clear that the mass

was an ectopic gestation, and that it had ruptured. It was also evident that even the least degree of added depression would prove fatal. Our efforts were accordingly directed toward increasing her margin of reserve strength in the quickest, quietest, and surest way. During the next four days her pulse records were made every three hours, as follows: ?, 156?, 142, ?, 146, 148, 148, 142, 140, 140, 128, 138, 126, 122, 128, 122, 130, 124, 124, 122, 120, 134, 132, 118, 116, 108, 108, 112, 110. As the pulse grew less rapid, its volume and strength improved.

Blood examinations were made as follows: November 14 (the day before rupture): hemoglobin, 65 per cent.; red cells, 3,960,000; leukocytes, 6400. November 19 (three days after rupture): hemoglobin, 55 per cent.; red cells, 2,100,000; leukocytes, 7520. December 4 (four days before operation): hemoglobin, 70 per cent.; red cells, 3,600,000; leukocytes, 7500. January 31, 1906 (fifty-three days after operation): hemoglobin, 80 per cent.; red cells, 4,360,000, and leukocytes, 9400.

By December 8 (twenty-three days after rupture) her general condition seemed such that she could stand an operation with very little risk. The abdomen was opened, about a quart of blood clot was found ensheathed in a sac with walls made of organized blood and lymph, and with adherent intestines. When the clots had been removed, the ovary and tube were found to be within the newly formed blood cavity. The tube was ruptured in four-fifths of its circumference, one-half inch from the cornu of the uterus. She recovered from operation quickly and completely. I shall always believe, however, that if operation had been done during the first four days by any surgeon in the world, this patient would have died. During the period of preliminary treatment, I felt no anxiety whatever regarding recurrent hemorrhage or a favorable, ultimate result.

The treatment consisted in a slight elevation of the foot

of the bed, the application of external heat, one pint of normal salt solution given slowly into a vein, strychnine, camphor, and adrenalin solution given cautiously. As soon as reaction began, she was given fractional doses of morphine hypodermically, and just in sufficient quantity to enable her to remain quiet, with death-like stillness. She simply vegetated, thus expending the smallest possible amount of energy. From the first her improvement was gradual, but definite and progressive.

This patient is but a type of a large number I have seen and treated in like manner. In each instance the patient has recovered from the effects of her sudden and profound anemia.

Many authors look upon temporary delay, until the patient has rallied from shock, as being permissible, and still others sanction delay for some weeks under competent supervision.

"The abdomen should be opened as soon as preparation can be made. If the hemorrhage has ceased a few hours, watchful delay, until reaction has taken place, is permissible." (Henry T. Byford, *Text-book of Gynecology*, 1897, p. 519.)

"The general rule is to operate without delay" (Dudley). Yet, in this connection, he reports two cases in which he did not deem it wise to operate on account of apparent collapse. Both patients recovered without operation. (Dudley, *Gynecology*, 1902, p. 493.)

If one waits several hours, hemorrhage has very likely ceased. If it has ceased, and if, as seems probable, it will not recur with appropriate treatment, then it seems reasonable that by further delay the patient may regain her lost blood and her normal strength. With that increase in reserve strength, the risk of operation must, of necessity, be reduced.

It is my belief that if a well-planned line of treatment is employed with the same degree of skill and precision as would be demanded for an operation, recovery from acute anemia will be the rule and not the exception.

"It is true, however, that cases sometimes recover by the spontaneous and gradual cessation of bleeding." . . . "Immediate operation is the best and safest treatment, and the physician should be content with nothing less when an operation can be performed." (E. P. Davis, *Text-book of Obstetrics*, 1896, p. 382.)

Boldt has had quite a series of patients with tubal abortion recover completely and permanently without operation. It would seem that during the last few years many gynecologists are receding from the earlier position, that immediate operation is imperative. That change of position has been forced upon them by personal observation. It has happened to most operators of wide experience, that the occasional patient is not operated upon for one cause or another, and yet she survives rupture under the most adverse circumstances. Evidence is unquestionably accumulating that early rupture (within twelve weeks) and tubal abortion are not in themselves essentially fatal; indeed, they are rarely fatal, if appropriate treatment is employed.

In the writer's opinion the so-called expectant treatment should not consist in weak and vascillating delay, with inaction. The indications for treatment are definite and the measures simple; but the manner and extent of application require mature judgment in many instances. Briefly, the essential features are: a competent, quiet nurse of strong personality; *absolute* rest in one position, without a single voluntary movement. The absolute avoidance of examinations is often desirable. In serious cases, the diagnosis can usually be made from the history alone, and in such cases it is most unwise to run the risk of starting fresh bleeding by a vigorous examination. The unnecessary expenditure of energy can be controlled by the use of small doses of morphine. Normal temperature is to be kept up by external heat. The volume of blood lost may readily be replaced by a small quantity of normal salt solution given cautiously

into a vein. It may be maintained by continuous enteroclysis, normal salt solution being used at the rate of 10 to 15 ounces an hour. The equilibrium of the circulation may be established by the use of small doses of strychnine, camphor, and digitalis, and by the use of small doses of adrenalin chloride given with the intravenous injection or with the enteroclysis.

Care and much good judgment must be used to avoid raising blood pressure sufficiently to cause fresh bleeding, though I am inclined to the belief that this danger has been overestimated.

In conclusion, it seems to me that the indications for immediate operation are definite, and that the indications for deferred operation, with careful preliminary treatment, are equally definite.

The essential feature in either case is to save life. If the patient's condition is not desperate at the time of rupture, operation may be done with safety. It then possesses the advantages of a shorter convalescence and fewer and less firm adhesions. On the other hand, if the margin of reserve strength is reduced to a very low limit, operation or any other severe depression may readily wipe it out with a fatal termination. In such cases, the very desperate cases, it seems to me that we are to think of life alone and not of the question of convalescence.

The objects of operation at any time may be:

1. To control bleeding which is in progress.

2. To prevent the recurrence of bleeding which has ceased, or

3. To remove the debris incident to tubal abortion or rupture.

Regarding the first indication for immediate operation, it has been said, and I think truly, that in the vast majority of instances hemorrhage has already ceased long before the abdomen is opened. This may readily be believed, espe-

cially as to operate in two hours from the time of rupture would be an unusual achievement.

The prevention of recurrent bleeding, where hemorrhage has already ceased, can, with safety, be effected by practical hibernation induced by morphine and *absolute* rest. This means of preventing a return of bleeding is far more simple and safe than adding the depression incident to an abdominal operation.

An operation designed for the removal of pelvic pathology or abdominal debris should, if possible, be done at a period of election. That period is not at a time when the margin of reserve strength is at the lowest point, but after the victim of hemorrhage has regained sufficient energy to pass through the ordeal of operation with comparatively little risk.

It seems to me that in the case of immediate operation, the following combination of conditions is an absolute requisite of uniform success.

1. Slight hemorrhage which does not reduce the margin of reserve strength to a very narrow limit.
2. A competent operator.
3. Skilled assistants and attendants.
4. Appropriate surroundings.
5. And adequate preparation.

On the other hand, any one of the following conditions will render deferred operation safer, and hence preferable:

1. Profound depression due to serious hemorrhage, with or without other associated lesions.
2. An unskilled operator.
3. Inadequate assistants, attendants, or facilities.
4. Hasty or inadequate preparation.
5. The need of transferring the patient to a hospital, thereby seriously increasing the risk of continued or renewed bleeding.

THE INFLUENCE OF THE CENTRAL NERVOUS SYSTEM IN THE CAUSATION OF UTERINE HEMORRHAGES.

By Hugo Ehrenfest, M.D.,
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"Intractable uterine hemorrhage" appears with striking frequency in recent literature as an indication for hysterectomy. This is surprising. Uterine hemorrhage is not a disease *sui generis*, but only a symptom. If in these cases, in opposition to our modern ideas of rational therapy, not a definite pathologic condition, but a symptom, justifies or necessitates this radical form of treatment, we seem justified in deducing that in certain instances of very persistent metrorrhagia the underlying disease either cannot be recognized or possibly cannot be named, on account of a lack of an appropriate term in our medical terminology. The propriety of this latter deduction is proved by facts. Some of these cases appear under the name chronic metritis, but this term, in the light of recent research, does not designate a disease of separate entity, but rather comprises a number of conditions which, from the standpoint of etiology and pathology, are essentially different from each other.

Most of the older writers emphasize the fact that the lack of satisfactory knowledge concerning chronic metritis, also named uterine infarct, uterine fibrosis, hypertrophy of the uterus, engorgement, etc., is due to the obvious scarcity of material on which to study the pathology of this disease, especially in its incipient stage. At present the conditions in

this respect have thoroughly changed, and nevertheless we still are far from a satisfactory settlement of the question of the etiology and pathology of chronic metritis, and are still in doubt concerning the cause of some of those "uncontrollable metrorrhagias" which demand hysterectomy.

The microscopic study of uteri extirpated for this reason has shown that very often the endometrium is so slightly changed that its anomalies could not account for the persistent hemorrhage. More stress then was laid upon a study of the uterine wall. Findings, more or less common, in such uteri up to the present day have led to three theories by which the metrorrhagia is explained.

The oldest is based upon the presence in these uteri of a thickening of the tunica media of some of the arteries. This theory was first propagated by French writers, then further elaborated, especially, in Germany (Reinecke, etc). This theory of the sclerotic vessels still plays an important role in recent literature, but the belief is steadily growing that, while possibly a factor of importance, this sclerosis certainly cannot be regarded as the essential or only cause of the hemorrhage.

The second theory has been propounded by Theilhaber. It is based upon the observation that in the chronic metritic and the senile uterus the typical increase in the fibrous tissue of the uterine wall is accompanied by a distinct decrease of the muscular tissue. From this observation Theilhaber develops his theory of the relative insufficiency of the uterine musculature as cause of a metrorrhagia.

Anspach recently modified these two theories into a third new one, which may be termed the theory of the relative insufficiency of the elastic tissue.

These three theories are based upon certain histologic findings, and in no way refer to the possibility of a simple functional disturbance as the cause of a uterine hemorrhage.

Just twenty-five years ago Mayerhofer expressed his surprise that the gynecologist has so completely lost sight of the

fact that the uterus is a muscle, a fact in which the obstetrician always has been so thoroughly interested. Emmet has called the uterus an erectile organ, and recent histologic investigations (Keiffer) have furnished convincing proof for the correctness of this contention. The uterus certainly contains a very large number of bloodvessels, and very promptly reflects the effect of vasomotor influences.

In my opinion these two facts deserve very careful consideration in an attempt to explain obscure uterine hemorrhages. They obviously are dependent upon nervous influences, and anomalies in these influences could possibly account for certain forms of metrorrhagia.

In the following an attempt is made to show how functional disturbances of the uterus may be brought about by anomalous impulses transmitted to the genital organs from a normal or diseased central nervous system.

Before entering into a discussion of this problem I may be permitted to give the history of a case of intractable uterine hemorrhage which necessitated hysterectomy.

Mrs. F. E., seen for the first time February 15, 1906. Patient is twenty-seven years old; was pregnant five times. Gave birth to four children at full term, the youngest being two years old. Last pregnancy ended in the beginning of December, 1905, in third month of pregnancy, as spontaneous abortion.

Patient began to menstruate when fifteen years old; menstruation always very regular, every four weeks, lasting about seven days; flow always rather free; at times clots are passed. Never any pain.

Never seriously sick. Just before she married she had a few convulsions, which by the attending physician were diagnosticated as hysteric. No convulsions of any kind since she is married (nine years). In good health since married. Never any female trouble. Function of bowels and bladder normal.

During her last pregnancy, which began late in September, 1905, she suffered from excessive vomiting. Abortion occurred beginning of December without known cause, positively not criminal. The attending physician saw the fœtus. On account of a very severe hemorrhage this physician, a few days later, made a curettement. She continued to flow, and about Christmas a second curettement was performed. No result. Patient was sent to hospital, and beginning of January the third curettement was made. Up to beginning of February two more curettements were performed, but patient continued to flow. At no time since the abortion was the patient free of a hemorrhage. There never was observed any rise in temperature. Patient complains of a "terrible" cramping pain all over the abdomen, especially in the left side.

Physical examination: Patient does not look very anemic. Percussion and auscultation of lungs and heart show normal conditions. Bimanual examination proves rather unsatisfactory on account of the extreme sensitiveness of the patient. Uterus lies in movable anteversion and is enlarged. Appendages cannot be palpated. Bloody discharge from uterus. Examination with speculum negative.

The whole behavior of the patient during the examination, etc., suggests the advisability of making a careful examination of her nervous system. Pupils of equal size, react normally. Conjunctiva bulbi absolutely anesthetic, conjunctiva corneæ hypesthetic, pharynx anesthetic. Areas of anesthesia are found almost over entire face and portions of the abdomen, with distinct hyperesthesia in ovarian region, especially on left side. Anesthetic areas on the dorsal side of hands, with about normal sensitiveness along ulnar side of hands and arms. Patellary reflexes increased. Typical tubular field of vision. The field of vision is considerably reduced and is found practically of same size in distances of 50, 100, and 150 cm., respectively. Thus the diagnosis hysteria was positively established.

In view of this fact it was decided first of all to watch the patient carefully in order to exclude malingering, and positively ascertain the fact that the patient actually is flowing continually. The patient was visited repeatedly, and at every visit subjected to an examination. Later, when patient again entered the hospital, her vagina was tightly packed with gauze strips, which were marked or put in in such a manner that any tampering with them would have been recognized. In this way I was able to ascertain beyond doubt that there was a continuous bloody discharge, varying in amount, but never ceasing. All therapeutic efforts failed. In view of the possibility that her metrorrhagia may be an hysteric one, strong suggestion was used and a general hygienic treatment instituted, all in vain. Since up to this time no histologic examination of any scrapings ever had been made, I finally yielded to the insistent demands of the patient and made another (the sixth) curettement, on March 6, 1906. Under anesthesia the uterus was found to be enlarged, the increase in size of the organ apparently being due to a uniform thickening of its wall. Length of uterine cavity only 8 cm. Left ovary is a little enlarged. Scrapings are placed in Zenker's solution. Microscopic findings: Endometrium is almost of normal appearance. No marked small cell infiltration. The glands seem to stand a little farther apart than normally, as the result of a slight increase in the amount of interstitial tissue. In certain places the epithelium shows an irregular proliferation. No signs of malignancy.

Immediately following this curettement the patient vomited persistently for nine days. The patient during this time apparently did not retain the smallest amount of food. Patient vomited after every attempt to give her even a teaspoonful of water. Nevertheless she looked well and had a diuresis of about 20 to 30 ounces per diem. It was obvious that the patient secretly obtained liquids and food, but we did not succeed in ascertaining the source. During this period of

hyperemesis the patient occasionally vomited clear red blood, and also passed blood from the rectum. Very careful examination of her mouth, throat, and nose did not reveal the true cause of these hemorrhages. The hyperemesis was finally suddenly stopped, when, *on her urgent request*, her stomach was washed out. During this time, by the attending nurse, most peculiar temperatures were recorded. Once the thermometer registered 110°, the pulse rate being about normal. The cause of this rise of temperature was easily recognized, and the temperature remained normal when the hot-water bag had been removed before the thermometer was inserted. A very exact examination of her urine and blood made at that time showed absolutely normal conditions. During the five weeks the patient remained in the hospital subsequent to the curettement, the uterine flow persisted continually, apparently uninfluenced by the curettement. The patient was finally sent home, against her wish, since she insisted upon another curettement. During the next few months the efforts were continued to check this hemorrhage by means of general and local treatment. Ergot, stypticin, styptol, were used internally and hypodermically; concentrated permanganate solution, melted antipyrine and salol, tincture of iodine, strong formalin solution, etc., were applied to the endometrium. Vagina and even uterus were packed tightly, all forms of suggestive treatment tried—all in vain. The metrorrhagia continued, and at no time was the vagina found free from blood. In spite of this hemorrhage the patient did not become anemic. Another examination of her blood again shows normal conditions. In the beginning of June the hemorrhage became much stronger; the patient more than ever before complained of pain. Her husband insisted upon some treatment which would finally cure his wife, and therefore, on June 14, 1906, a vaginal hysterectomy was performed. Uterus and left appendages were removed; the right appendages, being

apparently in perfectly normal condition, were left. Recovery was undisturbed. Only on second day after operation did the patient begin to complain of a very severe pain in the pyloric region, and vomited blood. On inquiry the fact was ascertained that the other woman who shared the room with my patient had a gastric ulcer. With the removal of my patient into another room the symptoms of a gastric ulcer promptly disappeared.

Ever since this operation the patient feels perfectly well. She has gained in weight and has no pain whatever.

An examination made in March, 1907, showed that the hysteric symptoms are practically unchanged.

Brief Description of the Specimen.

The uterus is slightly enlarged, 10.5 cm. long, of normal consistency; does not contain any nodules. Endometrium almost normal in appearance. Uterine wall is thickened, measuring 2.8 cm. Left ovary contains two small cysts; left tube is perfectly normal.

Brief Description of Microscopic Findings.

Sections were stained with hematoxylin-eosin, Mallory's, Van Gieson's, and Weigert's elastic tissue stain.

Endometrium is practically normal; in places signs of an interstitial endometritis. (Fig. 1.)

Concerning the proportion existing between connective and muscular tissue in the mesometrium no noticeable deviation from about normal conditions can be ascertained.

In many of the larger vessels of the uterine wall the thickening of the media is well marked. (Fig. 1.)

The elastic tissue seems well developed in all portions of the mesometrium, and is distinctly visible in the thickened media of most arteries. (Fig. 2.)

We then may summarize the essential features of this

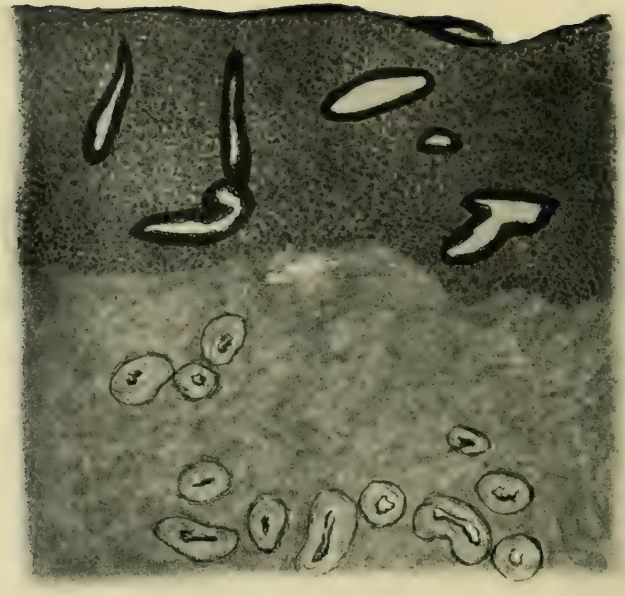

FIG. 1.—The glands in the endometrium stand rather far apart; the vessel walls are slightly thickened.

FIG. 2.—This section, taken from the fundus of the uterus, shows an approximately normal development of the elastic tissue. (Weigert's stain.)

case as follows: In a patient suffering from hysteria a uterine hemorrhage, which had started subsequent to an abortion or a curettement, respectively, persisted, in spite of all therapeutic efforts, continuously for six months A hysterectomy was finally the only resource left. The microscopic examination of both the endometrium obtained at the last curettement and that found in the removed uterus did not reveal any marked pathologic changes. The uterus did not contain any neoplasm (a chorio-epithelioma having been suspected). The following other known causes of uterine hemorrhages could be excluded in this case: Disturbances in the circulatory system, due either to heart failure, renal lesions, or obstructions in the portal system; functional disturbances of heart action; such systemic disease as diabetes, chronic alcoholism or morphinism, hemophilia, syphilis, etc. Masturbation or *excesses in venere* (Bossi, Koblanck, etc.) were positively denied.

According to the three theories mentioned above, we then would have to expect to find the cause of this metrorrhagia in certain histologic changes in the mesometrium, pertaining to either the bloodvessels, the muscular or the elastic tissue.

A critical review, however, of the histologic findings in this case, together with a proper consideration of some of the arguments which have been made against the validity of both the sclerosis and muscular insufficiency theory (Shaw), in my opinion leads to the conclusion that in this case the findings do not offer a plausible explanation of the unusual hemorrhage.

There are chiefly three arguments which at present can be advanced against the tendency to lay too much stress upon the sclerotic condition of the vessel walls: (1) In none of the uteri so far examined have ruptures of such vessels ever been observed which actually could account for the metrorrhagia. (2) These sclerotic changes are essentially different from the typical arteriosclerotic changes as found in patients suf-

fering from a general arteriosclerosis or in senile uteri (Theilhaber, Anspach, Shaw, etc.). (3) Sclerosed vessels can be found in the uteri with perfectly normal menstruation, and are absent in uteri extirpated on account of uncontrollable hemorrhages (Shaw). Such sclerosis, in fact, is an almost characteristic feature of the multiparous uterus (Pankow).

In consideration of the fact that my patient did not show any symptoms of a general arteriosclerosis, never had a syphilitic infection, was only twenty-seven years old, and five times pregnant, I feel justified in assuming that the changes in the media of some of the vessel walls were those of a physiological sclerosis, and not caused by a true arteriosclerosis.

The following objections can be made against the method adopted by Theilhaber, Meier, and Lorentz for the estimation of the proportion between the muscular and fibrous elements in the uterine wall: (1) The efficacy of the method is entirely dependent upon the personal judgment of the individual examiner and his ability to estimate. Therefore, the method is inaccurate. (2) The proportion between these two elements is constantly changing, physiologically, as the woman grows older, and especially under the influence of pregnancies. In the special case the findings cannot be compared with any standard proportion, and thus it is practically impossible to determine in the individual case whether the estimated proportion is still within the limits of the possible physiological deviation.

So far as my specimens are concerned, it can be said that, apparently, the connective tissue was hypertrophied, but possibly not more than could be expected after five pregnancies. In none of those portions of the uterus which were examined did the amount of muscular tissue seem strikingly small.

It must be mentioned in this connection that Shaw, who carefully followed the method of Theilhaber, came to re-

sults quite different from those obtained by Theilhaber, Meier, and Lorentz. According to Shaw the chronic metritic uterus does not show an actual decrease in the amount of its muscular elements. Anspach also stated that he was unable to verify Theilhaber's claim. In my opinion, however, the work of these two investigators does not actually discredit Theilhaber's theory. It possibly is unjustified to proclaim an atrophy of the musculature as a typical occurrence in chronic metritis, and, nevertheless, Theilhaber's idea of the relative insufficiency of the uterine muscle as cause of certain forms of metrorrhagia still seems entirely feasible. While Theilhaber attempts to support his theory by proving a partial atrophy and actual deficiency of the muscular elements, in my opinion the insufficient function of the musculature, possibly in a more satisfactory manner, could be explained as the result of anomalies in its innervation.

In reference to Anspach's theory, I repeat the statement already made, that my sections would seem to prove the presence of an approximately normal amount of elastic tissue all through the uterus. A pronounced lack of elastic tissue certainly cannot be assumed in my case as the cause of the persistent hemorrhage.

There is, then, only the fact that this patient suffered from an hysteria left as possibly furnishing an explanation for her intractable metrorrhagia. The question whether the metrorrhagia in this particular instance was simply a functional one, I wish to answer in the affirmative, and I shall give in the following the available arguments for my contention that irregular and persistent uterine hemorrhages may be directly due to local vasomotoric disturbances, or to an abnormal tonus of the uterine musculature, brought about by an abnormal influence of the central nervous system.

The idea that the central nervous system may play a role in the etiology of functional anomalies of the uterus is not a

new one. A study of the literature reveals the noteworthy fact that, while writers at the end of the eighteenth and the beginning up to about the middle of the nineteenth century constantly mention the possibility of a psychic or nervous influence in the causation of amenorrhea, menorrhagia, and metrorrhagia, this thought almost completely has disappeared from the writings of later and recent authors as far as menorrhagia and metrorrhagia is concerned. Only occasionally in very recent literature the existence of an hysteric uterine hemorrhage again is acknowledged. This peculiar change of views, ending with a tendency to return to old antiquated ideas, in my opinion, must be ascribed to the influence of histopathology in the development of modern medicine. Simply functional diseases, disturbances without a visible pathologic-anatomic cause, without a reponsible bacterium or cytotoxin, have fallen into discredit. The history of medicine, however, shows clearly that every new method of examination, every new theory which attempted to explain phenomena heretofore unintelligible, at first has found too wide an application. The literature of the last fifty years contains innumerable contributions to the question of chronic metritis and metrorrhagia. But, as already stated in my introductory remarks, in spite of the most painstaking study of minute histologic changes, the actual cause of some forms of irregular hemorrhage from the uterus as yet has not been revealed. We, therefore, cannot be surprised to meet in recent contributions of Theilhaber, Kroenig, Vedeler, and a few others with the statement that there exists a functional, nervous metrorrhagia. Of course, this return to the old idea to a certain extent is also due to the advancement of our knowledge concerning the physiology of the uterus.

It is my intention to present here all arguments extant in favor of a theory that in certain instances uterine hemorrhages are due to a faulty innervation affecting either the

vasomotor nerves of the uterus or those nerve plexuses and centres which regulate the uterine tonus. It is obvious that these same disturbances of innervation also must show an anomalous influence on menstruation and on the contractions of the pregnant uterus. I, therefore, may be permitted to include in this consideration literature which tends to prove the etiologic relation of a direct psychic or indirect reflectory influence of the central nervous system to amenorrhea, menorrhagia, abortion, sudden cessation of labor pains, etc.

The *Dictionnaire des Sciences Médicales*, published in Paris between 1815 and 1820, gives a very clear status of medicine in the beginning of the nineteenth century. Vol. xx contains a chapter entitled "Hémorrhagie utérine spasmodique"; vol. xxiii one on "Métrorrhagie spasmodique et ataxique" (by Monfalcon). These articles speak *in extenso* of the uterine hemorrhages so frequently caused in nervous women by psychic influences which lead to a *spasm local de l'uterus*. The remarkable effect of antispasmodics and narcotics in the treatment of these metrorrhagias is emphasized, a fact which I shall further discuss later on. It may be interesting to state that one of the papers which refers to this important observation was published by Hoffmann in 1730.

Among writers of about the middle of the past century, Hewitt, Chiari, Kiwisch von Rotterau, and others repeatedly mention in their text-books the possibility of uterine hemorrhages being caused by sudden emotions, continued depression, mental grief, imagination, etc.

Very clearly, more than twenty-five years ago, the essential points of our problem were set forth by Goodell in his *Lessons in Gynecology*, a book remarkable in many respects. "Whenever we find a train of symptoms associated with a congested or otherwise diseased womb, we jump to the conclusion that the uterine lesion is not a symptom, a sequence,

or a coincidence, but the factor, and at once proceed to treat it as such. We overlook the tyranny of woman's oversensitive organization, and underrate the influence of nerve perturbations or of a psychical disturbance." In an excellent chapter dealing with hysteria and neurasthenia the fact is emphasized that among the symptoms of these neuroses those of circulatory disturbances are most prominent. They consist of local anemias and local hyperemias. "The anemia of the reproductive organs is exhibited by amenorrhea, or by scanty menstruation, etc., the hyperemia by congestion, dysmenorrhea, menorrhagia and leucorrhea." Emmet cites a number of instances of sudden cessation of menstruation as the result of psychic emotion, and emphasizes the fact that all these patients were nervous. "When a sudden suppression of the menstrual flow occurs from emotional causes the result should be accepted as evidence of some previous defect in the nervous system." The importance of psychic influences upon the action of the uterus is mentioned in the works of Simpson, Schroeder, and others. Schroeder thinks that "in analogy to similar observations, *e. g.*, on the intestines, this effect probably is due to a stimulation or paresis of vasomotor nerves."

Turning to the literature of a more recent date, one notes the difference in the attitude of either the gynecologist or neurologist toward the subject discussed here. The latter very often mentions the fact that abnormalities of menstruation, both in form of amenorrhea and menorrhagia, are common in the course of psychic disturbances or other diseases of the central nervous system, but it is evident that he is not particularly interested in this symptom. Windscheid and others complain of this utter lack of reliable reports concerning menstrual changes in diseases of the nervous system. The gynecologist, on the other hand, in spite of the vigorous efforts of Goodell and many other writers, still seems to be unduly influenced by the old—one could call it Hippo-

cratic—idea of the development of all sorts of nervous disturbances as the result of primary gynecologic diseases. As a rule, he is satisfied to state in his reports that the patient is "nervous," and very often he declares her to be "hysteric." The necessity of a familiarity with the symptomatology of all the more common diseases of the nervous system just begins to be appreciated by the modern gynecologist, and more valuable records of observations in this class of cases can be expected in the near future. The neurologist in this respect always will be at a disadvantage, since the diagnosis, and especially the positive exclusion, of existing gynecologic anomalies demands a manual dexterity which can be acquired only by continuous practice.

According to Krafft-Ebing, Church and Peterson, Eulenburg, Ziehen, Craig, etc., disturbances of menstruation are frequently observed in insanity, especially in the primary stage of the disease. It is generally stated that amenorrhea is decidedly more common than menorrhagia. These disturbances are variously explained as expressions of constitutional or local disturbances of nutrition, as the result of an atrophy of the uterus or of atrophic changes in the ovaries, but in Krafft-Ebing's belief may be due to "disturbances of the vasomotor innervation," according to Church and Peterson to "profound changes in the general nervous system influencing the spinal centres for ovulation and menstruation," or, as Eulenburg states, "often are of nervous or nervous-anemic origin."

In the course of certain diseases, *e. g.*, progressive paralysis (Petit) or melancholia (Craig, Ziehen), an even slight or only very temporary improvement (in the latter disease a recovery) is always accompanied by a prompt restoration of normal menstrual function. This observation, in my belief, is a very weighty argument in favor of a theory that these changes were brought about only by such temporary disturbances as anomalies in the vasomotor system or the

muscular tonus of the uterus. It seems impossible to assume that organic changes in the uterus of such a nature that they would cause amenorrhea could so readily disappear. An assumption that the amenorrhea is the result of temporary anomalies in the function of the ovaries, possibly of a cessation of their internal secretion, on the other hand, could not be construed as an argument against the contention of the vasomotoric origin of the amenorrhea, since the influence of the ovary upon menstruation, by means of its internal secretion, can be explained only on the basis of a vasomotor influence.

Interesting in this connection are also the observations of Phenomenoff, Axenfeld, Mueller, and Cushing concerning an amenorrhea which often precedes the first characteristic symptom of a brain tumor. Mueller, in a critical discussion of all the possible causes of this phenomenon, is able to exclude the following, at least for his five cases: That the tumor is the result of an amenorrhea, according to an old and antiquated theory, which is based upon the false interpretation of a correct observation; that both the tumor and the menstrual anomaly originate from a common cause, which would be possible, *e. g.*, in syphilis or tuberculosis; that the amenorrhea is caused by a cachectic or debilitated condition of the patient, which seems impossible, in view of the fact that menstruation in these cases often disappears long before the tumor manifests itself by any symptoms; or that the amenorrhea is due to an atrophy of the uterus. This has been actually observed, *e. g.*, by Cushing, but in all cases of Mueller in which an autopsy has been made the uterus was found in an apparently normal condition.

In Mueller's opinion, then, the only explanation left is that the tumor directly affects a portion of the brain, which exerts a control over the function of the uterus or ovaries. Such an assumption is plausible, because all functions which are controlled by the sympathicus (*e. g.*, micturition)

to a certain extent also are subject to a voluntary or automatic regulation through cerebral centres. In view of certain observations, the localization of the tumor seems of importance, and a localization in or near the hypophysis seems specially prone to lead to this symptom of amenorrhea.

Mueller concludes with the statement that the question whether this amenorrhea is directly due to vasomotoric disturbances which either change the general blood pressure or local circulation, or is indirectly due to changes in the function of the ovaries, can at present not be decided.

In my belief, Mueller's conclusions can be narrowed down to vasomotoric disturbances of a local nature as the only possible explanation, at least for some cases. Temporary changes in ovarian function, as already explained, could only lead to temporary disturbances of menstruation. A persistent amenorrhea could be produced only by a continued cessation of ovarian functions, which would find its expression in an atrophic condition at first of the ovaries, later of the uterus. But Mueller found the genital organs normal at the autopsy, and Hunter Robb reports two cases of a complication of pregnancy with brain tumors. That the general blood pressure cannot be of very great importance in the causation of uterine hemorrhages, in my opinion, is proved by the fact that the menstrual flow starts at a time when an increased blood pressure has returned to its normal or even below its normal height, a fact which shall be considered later on. There is then left as the only possible cause of the amenorrhea an effect of the brain tumor upon those centres which control the tonus of both the vessel walls and the musculature of the uterus.

Patients suffering from chronic morphinism, as a rule, are amenorrheic (Eisenhardt, Windscheid). The uterus in these patients is small; but for some time the claim has been made that its reduction in size cannot be due to an atrophy, because very often after even short withdrawal of the opiate

the menstrual flow will promptly reappear. In such instances a small uterus with an apparently far advanced atrophy has been seen to return quickly to its normal size, and soon to harbor a fertilized ovum. In the light of our present knowledge this shrinkage of the organ, with the concomitant cessation of its menstrual function must then be ascribed to a persistent contraction of the uterine musculature. The distinctly hemostatic effect of so-called antispasmodics and narcotics in certain forms of metrorrhagia, as already stated, was known at the beginning of the nineteenth century.[1] Recently this question has again been studied by Lautand, and especially by Rotter, the latter actually suggesting a systematic treatment of profuse menorrhagia by means of opiates.

It would seem obvious that, if the theory discussed here is correct, anomalies of menstruation must be extremely common in those diseases of the nervous system which are characterized by disturbances in the vasomotor apparatus. This certainly is true for the functional neuroses hysteria and neurasthenia. But in regard to other diseases the information which can be found in literature is extremely scanty.

Cassirer recently has published a volume of more than 600 pages, entitled: "Die vasomotorisch-trophischen Neurosen." All the diseases belonging to this group are described with much detail, and the fact is repeatedly stated that these diseases are much more common in the female. Innumerable histories of cases are given, and hardly a dozen contain any reference to menstruation. According to Eisenhardt, menstrual disturbances are common in myxedema. As a rule, menstruation disappears, but in several instances a menorrhagia or metrorrhagia has been recorded. Moebius states that Graves' disease does not manifest any noticeable effect upon menstruation. According to Eulenburg, amenorrhea in this disease is not rarely observed, while it is claimed

[1] Dictionnaire des Sciences Médicales, Paris, 1817, vol. xx.

by Popoff that in the course of this disease hemorrhages from uterus, nose, gums, etc., are not infrequent. This same lack of reliable information may be noticed also in reference to tabes dorsalis. Leyden claims that marked changes of menstrual function do not occur, but Fehre, who obtained the menstrual history of 24 tabetic patients, found that in 9 of them menstruation was irregular and the flow profuse, in 2 it was scanty, in 5 the first menstruation had appeared rather early, at the age of ten to eleven years, and had always remained profuse, while in 4 cases the menopause appeared at an age between thirty and thirty-seven.

Before concluding the consideration of the neurologic literature on our subject we shall have to discuss the question whether the anomalies in the central nervous system in such cases could not be the effect rather than the cause of the disturbed menstrual function. An immense literature on this question has accumulated during the past decade. Its careful discussion here would be impossible—seems, indeed, unnecessary. It cannot be denied that diseases of the female genital organs under certain conditions can lead to distinct symptoms of a neuropathologic nature or can aggravate a coexisting disease of the central nervous system, *e. g.*, transform a latent into an acute hysteria, with sudden development of motor, sensory, or psychic phenomena. The idea that an amenorrhea in itself, *i. e.*, the lack of a regular discharge of "poisonous" blood from the system, could cause insanity, today must be regarded as thoroughly antiquated. Uterine hemorrhages, either menorrhagia or metrorrhagia, could result in actual disturbances of the nervous system only by way of a primary serious impairment of the general health of the patient. The arguments advanced by Rohé, Hobbs, etc., in proving an alleged close relation between diseases of the genital organs and the nervous system do not apply to our subject. This can easily be demonstrated. Hobbs, by examining 220 insane

female patients, found that 188 had distinct lesions of their pelvic organs. In 132 of these 188 cases the lesion was diagnosticated as subinvolution of the uterus and endometritis. This seems striking, but we feel justified in expressing our doubt concerning the reliability of this diagnosis. Hobbs states that the procedure of questioning these patients "as to the function of their reproductive organs was found barren of results, owing to their deranged mental condition." He therefore had to depend entirely upon examination under anesthesia, or possibly, although not stated by him, upon observations made by the attending nurses. The latter must be assumed, because bimanual examination alone is of rather limited value in the positive diagnosis of endometritis. One of the most prominent and important symptoms, menorrhagia or metrorrhagia, we assume, then, must have played an important role in the diagnosis. Such an observation is, however, apparently incompatible with the statement found almost in every text-book of psychiatry, that in insanity disturbances of menstruation are common, amenorrhea being the rule. The word amenorrhea is not even mentioned in Hobb's article. Any reasonable doubt concerning the correctness of the diagnosis endometritis, which in 131 out of a total of 188 insane patients with pelvic lesions necessitated curettement, must, however, weaken to a considerable extent the claim of Hobbs and others that even slight disturbances of the genital organs could lead to serious disorders of the central nervous system.

Much less space will be occupied by a discussion of recent gynecologic literature on this subject. Modern text-books, as a rule, mention the fact that sudden emotions, continued depression, grief, etc., may cause the sudden cessation of the menstrual flow or a more or less persistent amenorrhea. The common observation is usually recorded that a change of surroundings, *e. g.*, when girls enter college, country

girls come to the city, etc., often may result in a temporary suppression of menstruation. A notable case of this sort has been reported by Winter, of a girl of twenty years, who three times became amenorrheic for periods of three months, two months, and six weeks, respectively, when she came on a visit to Berlin. The mental factor in these cases is obvious; organic changes in uterus or ovaries would prevent the rapid restitution of a normal function of the uterus. Similar conditions apparently prevail in the amenorrhea of unmarried women who fear to be pregnant, or of married women who are extremely anxious to have a child, observations which certainly are not uncommon.

The fact that emotions have a very marked effect upon the contractions of the pregnant and parturient uterus is discussed in text-books of obstetrics, in chapters which consider the causation of abortion or the delay in the second stage of labor. Interesting in this connection is a most peculiar observation which quite recently I have made on a patient who gave birth to her eighth child. Several days before the confinement she assured me that her labor pains will start at 6 P.M., and her baby will be born three hours later, at 9. "It has happened exactly the same way during the last five confinements." The first really painful labor pain appeared at 6 sharp. At quarter past 8 the cervix was found completely obliterated, the head still movable above brim; membranes had ruptured at about 7. The patient was lying on her bed, facing a large clock standing on a dresser opposite the foot end of her bed. Next to her bed sat her husband, who consoled her during every labor pain, that in so and so many minutes, figuring to 9 P.M., all will be over. Distinct uterine contractions, apparently very painful, came very regularly every five minutes. Her husband continued to console her, that she will have "just two more pains," and finally that "the baby will be born with the next contraction." And with the next contraction,

without any warning, without any preceding bulging of the perineum, which was in full view, the baby glided out, in occipitoposterior rotation, and in that very moment the clock struck 9. There is no doubt left in my mind that this labor stood under control of a strong mental influence created both by autosuggestion and the suggestion of the patient's husband.

In strict contrast to the comparative frequency in modern literature of references concerning amenorrhea as the result of psychic influences or anomalies stands the scarcity of statements that these same influences also could cause uterine hemorrhages. Modern text-books of gynecology hardly ever mention this fact, and nevertheless I believe that cases of this kind are not by any means rare. Since my interest has been aroused in this problem I had occasion to carefully observe several cases in which menorrhagia undoubtedly was due to mental emotions. I think that most suitable for such observations are hemorrhages from the puerperal uterus which apparently for some time retains some of its increased irritability, developed during pregnancy and manifested during labor. For instance, a hemorrhage during the lactation period, especially the appearance of the first menstruation, often strikingly follows a sudden emotion, or occurs at a time of worry, usually over the sick infant. Recently I was called by a patient who, nine weeks after her baby was born, at that time had her second menstruation. The patient is an extremely nervous woman, suffering from a rather severe neurasthenia, with a few slight symptoms of hysteria. She never had a drop of milk in her breasts, and my baby was fed artificially. Unsolicited, she told me that the trained nurse, "Who alone knows how to take care of my baby," expected to be called out to a case, and "Every time the telephone rings I just feel how the blood gushes out." I found her vulva pad stained with fresh red blood, undoubtedly the result of an arterial hemorrhage. The

nurse within the next few days really was called out, and the hemorrhage became so severe that I had to place the patient to bed for several days.

Of recent contributions which actually refer to or deal with nervous and hysteric menorrhagia and metrorrhagia, mention may be made of those of Jolly, Menge, Lopez, Vedeler, Kroenig, and Theilhaber. According to Kroenig, menstrual anomalies like amenorrhea and menorrhagia in nervous and, especially, hysteric patients, as a rule, are solely due to vasomotor disturbances. In his belief this is proved by the following facts: The palpation of the genital organs reveals normal conditions; uterine scrapings show a normal endometrium; the menstrual anomalies improve and grow worse parallel with the hysteric or nervous symptoms of the patient; without any palpable local alterations in such patients an amenorrhea of several months' standing will alternate with profuse menorrhagia, and in many of these patients a general hygienic treatment yields a decidedly better result than local operative interference. In Kroenig's observation hysteric hemorrhages may reach a dangerous degree, and even call for hysterectomy. Theilhaber states that menorrhagia is not uncommon in patients suffering from either hysteria or neurasthenia, especially in the presence of a relative insufficiency of the uterine musculature. Interesting is his observation that uterine hemorrhages, as a rule, begin about twelve to twenty-four hours after a sudden fright or other mental shock. Since this point will be of some importance in later discussions, I wish to state that the appearance of a bloody discharge outside of the vagina does not permit the conclusion that the hemorrhage has just begun. In examinations with the speculum, made at about the time of expected menstruation, I have often seen a drop of blood filling the external os. At times I have not informed the patient of my findings, and requested her to note exactly when her next menstruation began. From

several observations made in this manner I am able to draw the positive deduction that if a uterine hemorrhage, possibly menstruation, starts with a slight flow, from twenty-four to forty-eight hours may elapse before the patient is aware of the fact that she is flowing. This knowledge seems of great importance in construing in certain cases a possible connection between a psychic shock and a uterine hemorrhage. Theilhaber explains the menorrhagia as chiefly due to a sudden increase of the general blood pressure, while, *e. g.*, in cases of mental depression the amenorrhea, in his belief, is due to an abnormally low blood pressure. His explanation, as he states, is based upon the theory, which at present, however, is recognized as erroneous, that the menstrual flow starts at the height of the menstrual wave, characterized by abnormally high blood pressure.

From the numerous references and observations recorded in the preceding pages, in my opinion, the following conclusions may be drawn:

1. Impulses coming from the central nervous system may alter the normal function of the uterus in regard to both menstruation and labor.

2. The resulting effect may appear either in the form of vasomotor anomalies (amenorrhea, menorrhagia, and irregular hemorrhages), or in the form of motor disturbances (sudden cessation or sudden beginning of uterine contractions).

3. With the exception of rather vague reference to disturbances in the vasomotor system and the uterine tonus, and the untenable theory of Theilhaber, no explanation is extant of the exact mechanism by which such a nervous influence may cause the symptom of amenorrhea or metrorrhagia.

In the following last part of my paper I shall offer such an explanation which, in my belief, is in entire harmony with our present knowledge of the physiology and histology of the uterus.

The motor function of the uterus stands under the control of three centres—cerebral, spinal, and local. While the existence of the first two has been established some time, only lately positive proof has been furnished by Franz, Roith, Keiffer, Kehrer, and especially by the ingenious experiments of Kurdinowski, that the local centres actually seem to be the most important in the regulation of the motor activity of the uterus. Kurdinowski studied the entire process of labor on two pregnant uteri of rabbits which had been completely extirpated and preserved in warm Locke fluid. In spite of this proved fact of an entirely independent function of the local centres, even Kurdinowski admits that the motoric function of the uterus also may be regulated by the two centres situated in the medulla oblongata and in the lumbar portion of the spinal cord (experiments of Goltz). This physiologic fact then explains the possibility of a direct influence exerted upon uterine function by an impulse originating in the central nervous system, *e. g.*, any mental influence. But I wish to lay particular stress on the fact that such a motor influence becomes noticeable also in form of a reflectory phenomenon, if a peripheral impulse is transmitted to the uterus by way of the central nervous system.

Firm uterine contractions, in experiments on animals, can be seen during irritation of the vagus, or of the central stump of the severed ischiatic nerve. Uterine contractions apparently occur as the result of mechanical irritation of the nipple area of the breasts. But even on the human being this reflectory contraction has been observed. In order to test Fliess' theory of the relation between nose and genital organs, Kossmann (quoted by Roith), during a laparotomy, irritated mechanically and chemically the middle of the lower turbinate, and could distinctly see how the uterus contracted and turned paler. On the other hand, Keiffer observed a relaxation of the uterine wall after irritation of the crural nerve; Schaeffer, during mechanical irrita-

tion of the internal os. Kossmann, in the course of that interesting discussion concerning the possibility of an atony of the non-pregnant uterus, stated that the wall of the non-pregnant uterus may lose its tonus as the result of an irritation of its interior, exactly as it occurs in the puerperal uterus in which some pregnancy products are retained.

It thus must be accepted as proved fact that the uterus may contract or relax under the influence of an impulse transmitted to it from the central nervous system.

As the result of the experiments of Kurdinowski, already referred to, no doubt is left concerning the existence of automatic and spontaneous contractions which rhythmically occur in the uterine musculature. They were described long ago (*e. g.*, Frommel), but the older experiments could not be accepted as entirely convincing on account of the possibility of errors. The sole contact of the uterus with air in the laparotomized animal seemed sufficient to cause firm uterine contractions, and it was known, through the experiments of F. A. Kehrer, that the uterus shows a marked tendency to respond with rhythmic contractions to any single irritation. All possible sources of errors seem to be effectively excluded from the technique invented and employed by Kurdinowski. This has been quite recently emphasized by Franz, who willingly subscribes to Kurdinowski's claim of such automatic contractions in the uterus of animals, because he himself succeeded in demonstrating them in a healthy human uterus. Franz was able to register these slight rhythmic contractions which occurred both in the longitudinal and in the circular fibers, being, however, less pronounced in the latter.

A uterine contraction of necessity must exert an effect on the circulation of the blood through the uterine musculature. In his splendid monograph on the bloodvessels of the uterus, R. Freund describes some interesting histologic pictures which he found, especially in the middle muscular

layer of the uterine wall. Through the crossing of muscle fibers loops and veritable vices are formed, through which vessels run, and in which they may be compressed in two directions during a uterine contraction. At times he saw a vessel squeezed into a sharp angle formed by a dividing bundle of muscle fibers, just as the clothes line is wedged between the branches of a peg. "These positions suggest the manner in which uterine contractions stop hemorrhages." In general it must be assumed that a contraction will show a more pronounced effect upon the thinner walled vein than upon an artery, and it seems plausible to assume that the slight rhythmic contractions then must help the deflux of the venous blood from the uterus (Mayerhofer, Theilhaber).

Up to a comparatively short time ago it was almost generally believed that both vasomotor and tonic changes in the uterus were regulated by the same centres and would respond in an identical manner to one impulse; in other words, that a uterine contraction always is accompanied by a vasomotor constriction, a relaxation of the uterine wall by vasodilatation. Keiffer, indeed, thinks that the whole uterus could be considered but a muscular expansion of the vessel walls. McDonald is so thoroughly convinced of the truth of this contention that she is willing to pronounce every theory defective "which even only apparently separates, in regard to its action, the uterine muscle from the bloodvessels."

Such a position seems untenable in the light of certain observations. Fellner, continuing experiments first begun by Basch and Hoffmann, apparently has positively proved that an irritation of the Nn. erigentes, those fibers of the sacral plexus which enter the hypogastric plexus, causes a contraction of the longitudinal fibers in the uterine body, with simultaneous active dilatation of the vessels in this area. The Nn. erigentes, which are motor nerves of the longitudinal fibers of the body of the uterus, undeniably

also contain vasodilators. According to Werth (Mueller's *Handbuch*), Frankenhaeuser was the first who claimed that in the beginning of a labor contraction the motoric stimulation of the uterine muscle is accompanied by a dilatation of the vessels, due to active vasodilator action. We possibly have to assume that the normal impulse for a labor contraction may reach the uterus by way of the Nn. erigentes, but we have above referred to the fact that the motor action also, entirely independent from the central nervous system, may be controlled by local centres alone. It certainly is interesting to note that Kurdinowski, in his experiments on the extirpated uterus, found that ergot, and especially adrenalin, which are known for their vasoconstricting action, showed a most pronounced effect upon the uterus. The fact that impulses for motor action can reach the uterus through different channels possibly accounts for the difference of opinion of different investigators concerning the coördination of tonus changes in the uterine musculature and vessel walls.

The muscular elements of the uterine wall show all the characteristics of unstriped muscles. Under normal conditions they are in a continuous state of slight contraction—that is, possess a tonus. This tone is increased and decreased by various influences. Uterine musculature contracts slowly, but, like all smooth musculature, may remain for a long time in a contracted condition (spasm of pylorus, globus hystericus, explained as spasm of esophagus, etc.). The tone may be increased or diminished by the action of motor or inhibitory nerve fibers, but the precise relationship between the changes underlying the development of tone and those leading to the formation of an ordinary contraction has not been satisfactorily determined (Howell). Schatz thinks that there also exists in the medulla oblongata a separate centre for inhibiting uterine contractions which has periodic intervals of depression. During the state of depres-

sion rhythmic uterine contractions occur (*e. g.*, during pregnancy).

Any acceptable explanation of the exact mechanism by which an impulse, originating in the central nervous system—a *mental* cause, or transmitted from the central nervous system—a *reflectory* cause, could result in the sudden appearance or the sudden cessation of a uterine hemorrhage, must be limited to the following physiologic and histologic facts:

1. The blood circulation in the uterus, in a very marked degree, stands under the influence of the vasomotor system, the uterus being an erectile organ.

2. The uterine musculature shows rhythmic spontaneous contractions.

3. Changes in the tonus of both the uterine musculature and vessel walls are subject to the influence of the central nervous system.

4. Uterine contraction at times (*e. g.*, when the impulse reaches the uterus by way of the Nn. erigentes) is accompanied by active vasodilatation.

5. The sudden cessation of a menstrual flow or a temporary amenorrhea developing as the result of an emotion, or in the course of certain diseases of the nervous system, often cannot be due to organic lesions in either uterus or ovaries.

6. The sudden appearance of a hemorrhage as the result of a mental shock cannot be explained, like the menstrual flow, as immediately due to certain degenerative processes in the walls of the endometrial vessels.

7. A sclerosis of some of the arterial vessels must be considered a physiologic condition in a multiparous uterus.

The spontaneous rupture of a bloodvessel is most likely to occur when the general blood pressure is above normal. On this principle was based the explanation of the beginning of menstrual flow (and also the theory of Theilhaber concerning the cause of functional disturbances of the men-

strual flow) until convincing proof has been furnished that under normal conditions the increased blood pressure of the premenstrual period has returned to its normal height, even fallen below the same, before menstruation has started.

It was next thought (Van de Velde) that the premenstrual fall of the blood pressure is due to a general relaxation of the tonus of the entire bloodvessel system, which relaxation in the endometrium causes a rupture of the capillaries. This explanation does not seem plausible. A relaxed bloodvessel does not rupture, at least not so long as it is in a normal histologic condition. Of course, it can be assumed that during the premenstrual stage pathologic changes of a degenerative nature may occur, but, to my knowledge, they have never been demonstrated. Such an assumption of necessary degenerative changes, for obvious reasons, cannot find a place in the explanation of a sudden nervous metrorrhagia. In this form of metrorrhagia the hemorrhage can be explained only by a sudden rupture of endometrial capillaries. This rupture, on the other hand, most probably must be the result of a sudden rise of blood pressure within these capillaries. But in view of the conditions prevailing at the time of the beginning of the menstrual flow, we seem forced to assume that the local blood pressure in the uterus at times may fall and rise independently from the general blood pressure. Such an assumption is entirely in harmony with physiologic facts. A localized increase of blood pressure is known, *e. g.*, in active hyperemia, in local inflammatory processes, etc.

A local increase of the blood pressure in the uterus, in my belief, will result from any tonic contraction of the uterus which is slight enough not to cause a compression of the arteries, but strong enough to effect a cessation of the rhythmic contractions of the uterus. Such a contraction probably is better termed a temporary increase of the uterine tonus. What will be its effect? The compression of the

thinner walled veins will interfere with the deflux of the venous blood. Since the arteries remain unaltered, a congestion results, which will be augmented by the absence of the rhythmic contractions, which certainly help to propel the venous blood. In this way a passive hyperemia is produced. This hyperemia must show its most pronounced effect in the capillaries of the endometrium for two reasons: (1) The capillary system of the endometrium in development greatly outranks the two other systems, viz., the subperitoneal and the intramusculary (Werth, Freund), *i. e.*, the largest portion of the arterial blood entering the uterus passes through the endometrial capillaries. (2) While the capillaries of the two latter systems, on account of their situation between the muscle fibers, are directly compressed by the contracting muscle, such a compressing effect is not exerted upon the capillaries lying in the mucosa. As the result of the passive hyperemic condition and the locally increased blood pressure, therefore, the endometrial capillaries must become dilated and finally will rupture.

This explanation of the rupture of endometrial capillaries seems also applicable to menstruation. The passive hyperemia just described as the result of an increased tonus of the uterine musculature here would be preceded by the active hyperemia of the premenstrual stage, which in itself causes a locally increased blood pressure, with a passive dilatation of the capillaries.

This theory of the mechanism by which certain uterine hemorrhages are started is in harmony and is actually supported by the observation that uterine hemorrhages are common in the presence of all those anomalies which (*a*) cause an increase in the general blood pressure (*e. g.*, heart failures, obstructions in the portal system, sudden emotions, excesses *in venere*, etc.), which (*b*) produce an active or passive hyperemia of the pelvic organs, especially of the uterus (*e. g.*, neoplasms, inflammations, subinvolution of the uterus, the

premenstrual stage, etc.), or which (*c*) impair the integrity of the endometrial capillaries (endometritis, new-growths, etc.).

This theory also is in accord with the fact that metrorrhagias are more common from uteri which contain sclerosed vessels. Sclerosed arteries, obviously, will be less affected by an increased tonus of the uterine wall. A contraction which in the normal uterus would be strong enough to cause the stoppage of a hemorrhage through compression of the arteries, in a multiparous or senile uterus will have only a slight effect on the sclerosed vessels. Such a contraction may, however, prove sufficient to completely interrupt circulation in the veins, and thus, by aggravating the existing passive hyperemia, lead to a noticeable increase of the flow—an effect which, according to the observations of Wittek, is obtained by the use of ergot in the treatment of a metrorrhagia from a sclerotic uterus. It seems not entirely improbable to me that the hemostatic effect of narcotics, referred to in preceding pages, then may be due to a resulting relaxation of an abnormally high tonus of the uterine wall.

The possibility that temporary changes in the uterine tonus may lead to changes of the local blood pressure finally will explain why disturbances of menstrual function actually are more frequent in "nervous" patients and in those who suffer from hysteria or neurasthenia (Theilhaber, Kroenig, Vedeler, Krafft-Ebing, Binswanger, etc.). Among the most pronounced symptoms of these neuroses we encounter motor anomalies of the unstriped musculature and disturbances of the vasomotor system. In neurasthenia the vasomotor disturbances usually are transitory, but in hysteria the motor and vasomotor anomalies are characterized by a certain permanency. We only need to be reminded of the peculiar conditions resulting from a persistent angiospasm (local edema, obscure hemorrhages in skin, from lungs, nose, stomach, etc.). The globus hystericus, by many writers, is ascribed to a spasm of the esophagus. Vom-

iting, frequent urination, retention of urine, diarrhea, etc., are symptoms frequently met with in hysterics. If anatomical lesions, as their respective cause, can be positively excluded, they may be pronounced as true hysteric symptoms, and then undoubtedly are produced by anomalies in the motor function of smooth musculature. But it seems that the unstriped muscle of the uterine wall in hysteria also very often is affected. Two of the many explanations of dysmenorrheic pain assume that in nervous, especially in hysterical, patients the typical uterine contractions are unusually strong and are perceived by the patient as a cramping pain. Theilhaber's theory of the cause of dysmenorrhea assumes that one portion of the musculature, that surrounding the internal os, during menstruation, contracts firmer than the rest of the uterine wall. Guillermi saw in an hysteric patient, pregnant four months, a firm contraction of the uterus, which persisted for one month, and finally was promptly relieved by suggestive therapy.

If this theory of a locally increased blood pressure due to an abnormally high tonus of the uterine wall actually explains the appearance of some uterine hemorrhages (probably also of the menstrual flow), it should be possible by this same theory to explain the sudden cessation of an existing uterine hemorrhage and of certain types of amenorrhea. This explanation can be given in the following manner: If the uterine contraction, presumably produced by an impulse originating in or transmitted from the central nervous system, is strong and firm, it will completely interrupt the circulation in the arteries and suddenly stop an existing flow (*e. g.*, sudden suppression of menstruation due to mental shock, or a peripheral irritation, like a cold bath, etc.). If this firm contraction occurs within a few days before menstruation, it may prevent the typical premenstrual congestion and result in non-appearance of the expected menstrual flow. In this category probably belong the cases of a temporary

suppression of menstruation in imaginary pregnancy. In these patients, for obvious reasons, this condition of fear and mental perturbation returns every month just before menstruation is due. In an hysterical patient, however, we seem justified, for reasons already mentioned, to assume that a more or less permanent firm contraction may persist for several months, and during this period cause amenorrhea. Amenorrhea, whether due to nervous influences or to local and general disease, if continuing for some time, may eventually result in an atrophy of the uterus, but Kroenig emphasizes that in hysteric patients this secondary atrophy is never observed. Therefore, a long period of amenorrhea often will alternate with a period of normal menstruation if the functional disturbance is brought about by an anomalous influence of the central nervous system, a point which is of considerable importance from the standpoint of diagnosis. The dependence of menstruation and all its anomalies from psychic moments quite recently has been demonstrated by Delius, who by means of hypnotic suggestion, has succeeded at will to order an earlier or belated appearance of the next menstruation, and, according to his claim, was able to control the duration and character of the menstrual flow.

Finally, I wish to show that this theory of the immediate cause of a uterine hemorrhage also is applicable to an explanation of menorrhagia and the normal gradual disappearance of a uterine hemorrhage. This latter process probably occurs as follows: The abnormal tonus of the uterine wall diminishes. When it has returned to normal the uterus presumably again begins to contract rhythmically. The deflux of the venous blood is not any longer interfered with. The escape of blood from the ruptured capillaries, on the other hand, promptly relieves the congestion and reduces the increased blood pressure in the arteries. The dilated capillaries are able to resume their normal caliber, and those that are ruptured gradually are closed up by thrombi.

If this normal process is disturbed, the hemorrhage either becomes profuse (menorrhagia) or continues unduly long.

We have referred in the first part of this paper to the investigations of Fellner, proving the possibility that a uterine contraction may be accompanied by active vasodilatation. Theoretically, we then have to assume that a more profuse hemorrhage may result if the impulse which leads to the rupture of the endometrial capillaries reaches the uterus by way of the Nn. erigentes.

The slight contraction of the uterus may persist. The embarrassment in the circulation of the venous blood continues, and the arterial hemorrhage will not cease until checked either by a sudden firm contraction of the uterus (*e. g.*, due to ergot) or by a gradual restitution of the normal tonus.

The increased tonus of the uterine musculature may not return to normal, but actually sink below normal and remain in this state. Such a condition could possibly be explained as due to fatigue after a period of continued contraction, but it has been shown that an active relaxation of the uterine muscles can be directly produced by certain impulses (Keiffer, Schaeffer, etc.). An abnormally low tonus of the uterine wall, by releasing the pressure normally exerted upon the bloodvessels in the mesometrium, will lead to a dilatation of these vessels and result in a venous stasis. This venous stasis will aggravate an existing hemorrhage and the accompanying relaxation of the uterine wall prevent the cessation of the hemorrhage in the typical manner.

A menorrhagia or metrorrhagia produced in this way must be rendered worse by the presence of sclerosed vessels and the absence of a normal amount of muscular elements, because these two anomalies will mitigate against the possibility of a stoppage of the hemorrhage by a firm uterine contraction. The sclerosed arteries will demand a contraction of abnormal intensity. Even a contraction obtained by the

administration of ergot, as already stated, may only result in an increase of the flow. This unusually firm contraction, however, in a uterus deficient in musculature can occur only under the influence of a very strong impulse, which may be wanting for a long time. Such an explanation of an "uncontrollable" hemorrhage from the uterus is in full harmony with two of the theories extant, viz., the theory of the uterine sclerosis and of the relative insufficiency of the uterine musculature.

It thus has been demonstrated that the theory offered in this paper, in an apparently satisfactory manner, explains the appearance of a uterine hemorrhage (including normal menstrual flow), the sudden cessation of existing hemorrhage, an amenorrheic condition, menorrhagia, and finally certain forms of uncontrollable or intractable metrorrhagia.

This theory explains the characteristic features of a normal menstrual flow on the basis of a normal activity of the uterine musculature, and proves that all the known functional disorders of the menstrual flow may be due to anomalies in this motor activity. Motor disturbances, however, can be interpreted only by a faulty innervation, and, therefore, the deduction seems permissible that this theory indirectly proves the significance of an anomalous influence of the nervous system in the causation of certain functional disorders of the menstrual flow.

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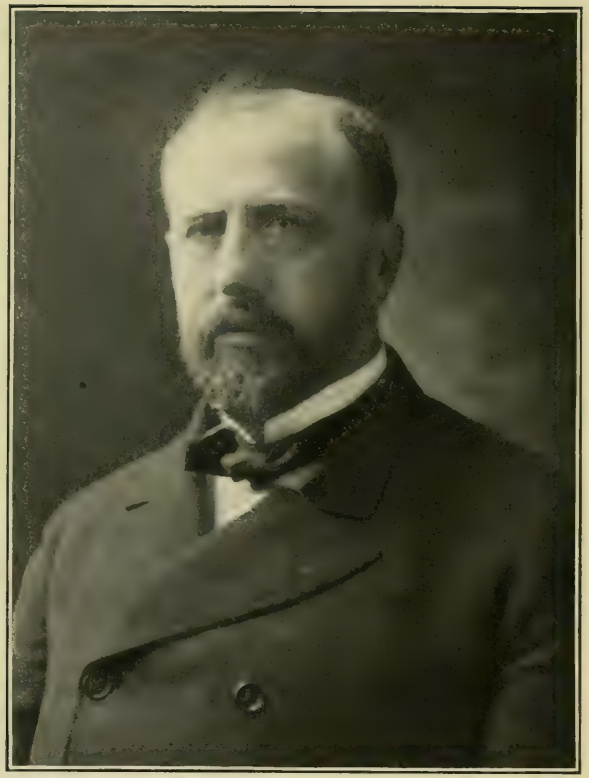

W. J. Herrold

IN MEMORIAM.

FERNAND HENROTIN, M.D.

September 28, 1847—December 9, 1906.

By Henry T. Byford,
Chicago.

Fernand Henrotin was born in Brussels, Belgium, September 28, 1847, and died in Chicago, December 9, 1906. His father, Dr. Joseph F. Henrotin, came to this country when Fernand was an infant and soon became one of the busiest and best-known practitioners in Chicago, then a city of about 200,000 inhabitants. After receiving a high-school education Henrotin matriculated at Rush Medical College and graduated in 1868. He married Emily B. Prussing, daughter of a prominent Chicago lawyer. I quote the following lines from a commemorative address written by his friend and neighbor, Dr. Nicholas Senn:

"In public life and in scientific endeavors, Henrotin always took an active interest. From 1868 to 1870 he was Prosector at Rush Medical College, Surgeon of the Police Department fifteen years, and during this time edited and published a booklet on *First Aid*, and for twenty-one years was the physician of the Fire Department. For some time he was interested in the National Guard of Illinois, and filled the position of Chief Surgeon of the First Brigade. He was one of the founders of the Association of the Military Surgeons of Illinois, and never lost sight of the interests of military medical affairs in this State. He served for many years on the medical staff of Cook County Hospital, and

at the time of his death was president of the Medical Board. It was through his energetic efforts, seconded and supported by Mr. Brundage, that the medical attendance of this hospital has been raised to its present standard of efficiency and brought under the jurisdiction of civil service reform. He was senior surgeon of the Alexian Brothers' Hospital and consulting gynecologist of St. Joseph's and German Hospitals. He was one of the founders of the Chicago Polyclinic, and served from its beginning to the time of his death as Professor of Gynecology. He succeeded Dr. Truman W. Miller as president of this institution. His most enduring monument is the new modern hospital in connection with this institution, now nearing completion. He was a member of the American Medical Association, International Congress of Gynecology and Obstetrics, State Medical Society, Chicago Gynecological Society, American Gynecological Society, and Chicago Medical Society. As president of the Chicago Medical Society he exerted all his energies to bring this society to a wider sphere of usefulness, and more than trebled its membership. He was president of the Chicago Gynecological Society and State Medical Society."

He was one of the founders of the International Congress of Obstetrics and Gynecology, and served as its American secretary for several years. His chapter on Ectopic Gestation in *Practice of Obstetrics, by American Authors,* and his article on Gynecology in the *International Text-book of Surgery,* deserve special attention. On his death-bed he practically completed the chapter on Vaginal Hysterectomy for Kelly and Noble's *Gynecology.* Dr. Henrotin was an ardent advocate of higher standards of medical education, and more especially in postgraduate work. He published a booklet about two years ago, *Democracy of Education in Medicine,* which is replete with many practical suggestions on this important subject. His last words were an expression of regret that he could not live to see the completion of the new building of the Chicago Polyclinic, which had been promoted by him and was being built under his supervision.

My first introduction to Dr. Henrotin was upon the occasion of asking his influence in procuring an appointment for a worthy young man. He could not help me at the time, yet, although he

had never before seen me or the young man, he kept us in mind, and, finally, after putting himself to considerable trouble, secured the appointment. At another time he was called to see a wealthy woman, who had formerly been a patient of my father. I was called in consultation, and an operation was decided upon. The patient expressed a preference for the hospital with which my father had been connected, and where I was working. Thereupon, Dr. Henrotin insisted that she would be better off there, and practically forced me to take the case out of his hands, he to assist at the operation. These instances are typical of his dealings with fellow-practitioners. Indeed, I have never been treated with such unvarying and genuine courtesy by anyone else.

He was not gentle of voice and saint-like in his manner. His voice was full-chested and sonorous, his speech spontaneous and free, his manner frank and sympathetic, and no man was in doubt as to his sincerity. He gave away several small fortunes in helping his friends and promoting worthy enterprises, and no one learned of it through him. It can be said of him without strain upon the imagination that it would have been easier for a camel to go through the needle's eye than for Henrotin to die rich. No wonder he made friends.

But he was not prodigal of his worldly goods only, for amid the activities of a strenuous career he gave unsparingly of his seemingly inexhaustible energy and strength, and never spared himself until the thread of life was broken. Like the sun that rises in the morning and floods the earth with light until afternoon clouds gather and obscure it prematurely, he lived and worked. But his light still shines beyond the clouds, and they reflect a tender radiance upon the paths of those who worked with him.

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